FOOD MANUFACTURE

Incorporating Food Industries Weekly

ARD HILL LIMITED, 17, STRATFORD PLACE, LONDON, W.1 JULY 1 1949

BUSH

nearly every part of the World
ese two famous Bush Trade
arks are associated in the minds
men of widely different Nation-
ties as symbols of quality in
vouring Essences, Concentrated
uit Juices, Essential Oils, and
Food Colours.

Known and appreciated throughout the World

BUSH

ESSENCE DISTILLERS SINCE 1851

W. J. BUSH & CO., LTD., LONDON, E.8. ENGLAND

QUALITI CHINA
JUL 1 1949
STATE LIBRARY

May we send you regular Price Lists?

STAFFORD ALLEN & SONS LTD. Wharf Rd. London N.1 CLErkenwell 1000

TAS/AI 34

FOOD MANUFACTURE

Vol. XXIV. No. 7 · Published Monthly · July 1, 1949

CONTENTS

	Page
Editorial	289
Fish Liver Oils	293
Vitamin Losses during Pea Processing	296
Dried Mashed Potato Blocks. *M. Ingram, M.A., Ph.D., and O. de Rousset-Hall, M.A.*	297
Quick Freezing Today and Tomorrow	301
Pioneers of Fertility	306
Scientific Information Services. Part 1. *Sir Alfred Egerton, M.A., F.R.S.*	307
Bacon Production in Denmark. *Collan E. B. Brett*	309
Ministry of Food—Statutory Instruments	312
The Canning of Anchovies	313
Meat Research	315
Quick Candying of Fruits	316
The Hydrogenation of Oils. Part 1. *F. H. Slade, A.M.I.Mech.E.*	317
Sugar Refining Problems	320
Zanzibar Cloves	321
Trade News	322
Information and Advice	335
Recent Patents, Trade Marks, and New Companies	336

Published by Leonard Hill Limited, 17, Stratford Place, London, W.1. Mayfair 7383. 1 year $4; 2 years $6.50; 3 years $8. Sterling rates: 1 year 20s.; 2 years 30s.; 3 years 40s.

GELATINES

A bright sparkling jelly can only be made from a Gelatine of good strength, clarity and colour. All our grades are tested strictly according to the methods of the British Standards Institution and standardised to a definite specification.

Our Gelatines are also submitted to the most exacting laboratory tests to ensure complete freedom from harmful impurities.

OURY, MILLAR & CO LTD.
THAMES HOUSE, QUEEN STREET PLACE, LONDON, E.C.4.

CAMBRIDGE INSTRUMENTS

FOR FOOD AND DRINK INDUSTRIES

THIS USEFUL BOOK 902-R
FREE on request

BAKERIES
DAIRIES
CANNING
BOTTLING
PRESERVING
COLD STORAGE
SUGAR BOILING
SUGAR REFINING
BREWERIES
DISTILLERS
TRANSPORT, ETC.

Executives of every food industry are bound to find valuable information in this publication. It details in a convenient and useful way where instruments may be applied with economy and advantage in the manufacture, preservation, storage and transport of food and beverages. Illustrated throughout with actual installations in a number of well-known factories.

CAMBRIDGE
INSTRUMENT CO LTD

WORKS: LONDON & CAMBRIDGE — *Head Office & Showrooms* — 13 GROSVENOR PLACE LONDON, S.W.1

FOOD MANUFACTURE

Vol. XXIV, No. 7 July 1, 1949

The Shape of Meals to Come

ON the matter of man's survival on this planet the pessimists have been more vocal than the optimists. Their pronouncements may have produced the impression that what we are about to receive is dependent upon what we are about to believe.

William Vogt's *Road to Survival* (reviewed in FOOD MANUFACTURE, April, 1949) contained a vivid exposition of the worst that could happen, but savoured more of a recipe for American survival than world survival. However, Vogt's statement of the problem of rising world population cannot be disputed; nor can Aldous Huxley's more fictional presentation of the same problem in his recent novel *Ape and Essence* be ignored. To face the fact that world population may be at least three billion by the end of this century is realism—not pessimism. One somewhat optimistic opinion has been expressed that rising standards of living in the backward areas of the world will lead, as they have led in other areas in the past, to falls in birth rates. But can standards of living rise quickly enough? The time factor is against the optimists in this part of the total problem.

In detail William Vogt's formula for survival—no aid from food producers without contraception by consumers—seems at least a century ahead of practical politics. Medical science, by discovering more drugs, sera, antibiotics, and the rest, is extending the span of even the most unlikely lives and is more likely to increase immediate population pressure than to reduce it.

But demand is, after all, only one side of the threatened crisis. Production of food is the other. If a balance can be held, there need be no crisis. The world will certainly produce more and more mouths and bellies, but can the world's soils and farmers produce more and more food? Here we find ourselves much less ready to toe the gloomy line of the starvation prophets. In a recent pamphlet from the Bureau of Current Affairs Sir John Russell said: "Estimates of the world's resources made forty years ago are in most cases far below those that would be made now. . . . The union of science and technology is so recent that no one can forecast the results." Or, in everyday terms, how do we know what can be done until we have really tried?

There are two factors that must be considered—first, the world acreage of useable soil, and second, the amount of food that can be obtained per acre. Neither of these factors has an absolute limit. The pessimistic school is much too ready to set a maximum figure to the total acreage available, and also far too reluctant to consider the possibilities of increasing its output. The contribution that can be made by modern agricultural science in both these directions is underestimated.

In assessments of world acreage erosion is the nigger in the wood pile. Vogt sees the soils of the major food-producing countries vanishing in clouds of dust and rivers of mud; soils breaking down under the strain of ever-increasing demand. Hugh Bennett, of the U.S. Soil Conservation Service, has been equally discomforting with warning pictures of erosion on the march. They are both erosion experts and we suspect that they have ceased to see the soil for the dust. Erosion is a consequence of bad and depressed farming. This century's "Dust Bowl" climax of erosion in the United States followed the years of surpluses and cheap food which had forced farmers to exploit soils rather than farm them. A steadily high demand for food is far more likely to assist soil conservation than to accelerate soil erosion.

Even if the erosion bogy is minimised, can the world's soils produce enough nutrition to keep future billions alive? We say "keep alive" deliberately, in spite of Boyd Orr's nutritional idealism. There are many diets between the optimum standard for nutrition and the starvation level, and it is within this range that most of the world has had to struggle along so far. Progress towards a good basic standard of nutrition for all must necessarily be slow. If some malnutrition cannot be avoided, nevertheless major crises of famine and starvation should be averted; the pessimists forget the immense opportunities that still remain for increases in food production per acre and per farm worker. It is said over and

over again that it takes 2 to 2½ acres to produce a year's nutrition for one adult. That is only a relative opinion—it is *not* an absolute fact. Who knows yet what an acre of soil can produce? And who knows whether soil that is marginal or useless in 1949 will still be classified in the same way in 1959 or 1969? Science is on the march though the ghost of Malthus walks again.

Peasant farming still operates on many millions of the world's acres; gradual integration into a more systematic agriculture would at least double the crop yields in many areas. Other rivers besides the Tennessee can have T.V.A. schemes. Millet can be developed as a suitable crop for semi-arid soils in India and Africa. New varieties have already taken wheat farther north in Canada and the U.S.S.R. Wheat production in Canada has never been limited by acreage but by the storage facilities for the harvests. Insecticides, fungicides, new weed killers, new fertilisers—these can save some of the huge losses of the past or raise yields well above past averages. The addition of small amounts of zinc to Australian soils has produced crops the growth of which would have been thought impossible a decade ago. Nor is the agricultural knowledge we possess today the limit of its possibilities for tomorrow; though, indeed, we are only just beginning to realise how much more food could be grown if yesterday's research were utilised.

On the production side of this predicted food crisis, we are on the side of the optimists while recognising that optimism is not another term for complacency or wishful thinking. A world food crisis can be avoided only if its possibility is clearly understood and squarely faced; even then the task will not be easy, but this century of the common man is not inevitably a century of approaching starvation—by the sweat of his brow and by the exercise of his grey matter man can still control his fate as a food-consuming organism.

Real and Imitation Honey

A number of people were surprised by Dr. Edith Summerskill's recent statement in the House of Commons that there was no appreciable difference between the food values of imitation honey and natural honey. Nutritionists, however, agree that she was right. Both products consist mainly of invert sugar, but the methods employed by the bee and the chemist are different. The chemist uses tartaric or citric acid for inverting cane sugar, but cannot thereby reproduce the flavour of real honey.

There is, of course, nothing like the real product, but it has been claimed that an addition of 5 per cent. of natural honey to the mixture of glucose and fructose produced by the chemist will result in a tolerable imitation; in fact, it has been said that up to 25 per cent. of invert sugar can be mixed with honey without the consumer being able to detect the addition. Golden syrup is one of the best invert sugars and can, it is declared, be added to clarified honey without its presence being noticed.

In view of all this, the desire in trade circles for a clear line of demarcation between natural honey, imitation honey, and blended products is readily understandable.

Cheese in Decline

The cheese connoisseur who so frequently deplores the absence of native British varieties and blames this (according to political temperament) upon Hitler's war or the present Ministry of Food may do well to consider Mr. W. B. Mercer's comments in the last issue of the *Journal of the Royal Agricultural Society*. British cheese production has been steadily falling off for many years, and this is due mainly to the rise of the modern milk sale business. The development of a stable and ever-increasing market for milk has undermined cheese-making traditions; it has also contributed towards the decline in pig-keeping and ham or bacon production.

As Mr. W. B. Mercer shrewdly observes, practically all the world's cheese is made from grass. The seasonal flush of milk that is based chiefly upon grazed nutrition was traditionally poured into the cheese-making departments of the farm dairies. All the cows were calved in the spring so that the spring and summer milk flow was at its maximum; and in the winter the cheese-making dairy farms went into a state of hibernation. In other words, the various local varieties of cheese were fundamentally the preservation products of a planned seasonal milk production.

The economic weakness was labour wastage rather than poor financial returns from the cheese. Producing milk for the Marketing Board's all-the-year-round demand is not a better proposition for farm income but it is a much easier and cheaper proposition for labour costs and organisation. A federation of cheesemakers managed to arrest the decline in cheese-making between the two wars by developing a cheese marketing scheme, but when World War II brought about a scarcity of rural labour this home-based resistance movement collapsed and the craft of cheese-making died.

Of Salop and Cheshire, Mr. Mercer reports that there are now "but a round dozen of makers." The idea that English cheese will come back one day "when things get better" would seem to be something of an illusion. The craft and the tradition are not still waiting to be revived. Our palates must continue to exercise themselves upon factory-made "Cheddar," processed "unnamed," and imported European varieties. For in France and Italy the craft of varietal cheese-making has survived, and we might well ask whether that survival is due to the absence (or lesser presence) of a well-developed retail market for liquid milk.

The effect upon pig production has also been significant. Summer cheese-making meant whey; and whey plus imported feedingstuffs meant pigs. Pigs were often more profitable than cows before the development of the Milk Marketing Board. So we have lost some of our English bacon too.

The gastronome has had to forego his former pleasures for the sake of mass organisation and mass nutrition. However tempting it may be for the individual to deplore and criticise this state of affairs, the national picture as a whole must be considered. Milk has become a universal foodstuff, especially for the younger generation. Whoever laments the disappearance of our native cheese must ask himself whether he would truly have it otherwise.

The World's Meat

Recent returns are enabling us to make a more accurate assessment of the meat situation in the world at large. They do not offer a prospect that the search for meat beyond the Argentine frontiers will have much immediate effect. In most of the Western European countries the 1947 drought had an enduring influence upon the livestock numbers of 1948; and the shortage of feed was not balanced sufficiently from increased imports. The only countries of the area in which a slight improvement in production could be recorded were Britain and Belgium.

Eastern Europe, however, could show modest advances; and the feed situation in 1948 must have been adequate to carry these improvements, though it will be remembered that in several of the countries the decline in livestock numbers during the war had been very serious. Not all the countries appear to have made marked progress in 1948; but the situation has been sufficiently promising in Poland, Yugoslavia, Rumania, and Bulgaria. Italy, Spain, and Portugal are also said to have shown some advance.

According to American observers the largest increase was probably in Russia, but here again it must be viewed against the decline in numbers during the war. The Russian authorities have reported war-time losses of 80 and 90 per cent. in many classes of livestock over several of the administrative areas of Ukraine and White Russia; and there is no particular reason to doubt these figures. The Soviet Government is making considerable efforts to conserve its breeding stock and to develop the industry; but it will be some time before the numbers reach the pre-war level.

In the United States the high slaughter rate of the immediate post-war years and the difficult feed situation early in 1948 are having their effect. The fall in meat production in 1948 was one of more than 800,000 tons. In the world as a whole, in fact, there was an apparent decline in 1948. American estimates give it as one of between 700,000 and 800,000 tons. This, it is pointed out, represents a decline of about 2·6 per cent. from the figures for 1947.

More cautious perhaps than it was with its groundnut scheme, the British Government is taking care to point out that the development of the cattle-raising Northern Territories of Australia cannot be expected to yield us much extra meat for another ten years or so. The scientific opening up of these territories is no doubt desirable; but critics have been quick to point out that if the population of Australia is to grow in the meantime at the rate of 100,000-150,000 persons a year, this annual increase will demand twenty to twenty-five thousand fresh head of stock to feed them, at the present Australian level of meat consumption. The problem is a nice one for the population statistician to solve.

Birth of a Verb

When Kensington High Street was in its heyday, there was a row of houses between Wright's Lane and the Adam and Eve public house known as The Terrace, where lived several eminent Victorians. Nothing remains of it now, but a picture in the Kensington public library across the road shows how it looked in 1892.

At No. 1 lived Dr. Davies, one time tutor to Queen Victoria; at No. 5, General Sir John Fraser, veteran of Waterloo; while Nos. 6 and 7 were tenanted respectively at different dates by John Leech, of *Punch* fame, and the artist Sir David Wilkie. Looking at the solid façades in the picture, it is not difficult to imagine the carving knife suspended over a savoury goose or a succulent sirloin as the Doctor retailed a snippet of gossip from Kensington Palace or the General

described, not for the first time, some feat of martial skill that had disconcerted "Boney's" troops.

No. 4, on the other hand, was tall and narrow, only one window wide all the way up, and here lived Dr. William Banting, famous as a writer on corpulence.

He had not always held the title of doctor. Born in 1797, he followed the occupation of undertaker and funeral furnisher, with premises in St. James's Street. Around middle age he found himself growing fat, which did not worry him very much at first, but as the years went on his steadily increasing girth made things very difficult for him. Before he was sixty he was unable to stoop to tie his shoes, was compelled to go downstairs backwards to avoid the jar of his weight on his ankle joints, and with every exertion "puffed and blowed in a way that was very unseemly and disagreeable."

He engaged in active exercises, including walking and rowing, but these only served to increase his appetite and so add to his weight. In 1862 he weighed 14 stone 6 lb.

Then one day he consulted Mr. William Harvey for deafness. Mr. Harvey, believing obesity to be the source of the trouble, prohibited bread, butter, milk, sugar, beer, soup, potatoes, and beans, and prescribed a diet of tea, meat, fish, and dry toast. There was a gradual reduction in Banting's weight and an improvement in his health. So delighted was he at the relief he had obtained that he rushed into print with "A Letter on Corpulence, addressed to the Public" which was published in 1863. It was rapidly sold out and ran into many editions. The author found himself suddenly famous and was subjected to the Victorian equivalents of being interviewed, filmed, autograph-hunted, and paid huge sums of money for writing his life story. He assumed the title of doctor, lived for another fifteen years, giving consultations to fellow-sufferers, and died at The Terrace in 1878, having added the verb "to bant" to our language.

Chippers Celebrate

At a time when potato crisp manufacture is recovering from its war-time restrictions in Great Britain owing to oil shortages, established "chippers," and those about to enter the field, will doubtless be interested in the Chicago convention of the National Potato Chip Institute. As an article in *Life* (March 14, 1949) states: "They had a wonderful time."

The convention hero was Sid Schechtman, 29, "who is to the potato chip what Omar Khayyám was to the jug of wine." During the convention "he lived mainly on a mixture of benzedrene and phenobarbitol," but got free publicity for chips in 600 newspapers by his picture of the "Convention Queen" sitting on the floor while a cascade of chips poured over her from an open shaft in the wall. Schechtman "constructs his finest inspiration—a bra made of potato chips with needle and thread." We gather from the photograph that "bra" was a way of referring to a *brassière*. This creation was worn by the "queen" as she sat on her "throne."

There were other fun and games too numerous to mention, but the chippers managed to interpolate some business during the proceedings. They heard that their industry, which amounted to "a measly $185,000 when chips were made by hand (a worker can now turn out 500 lb. of chips an hour instead of 30 lb. in the pre-mechanised age) had grown to $300 million a week."

Mauritius Sugar

Though the 250th anniversary of the birth of Count Mahé de la Bourdonnais may sound of little import to Great Britain, this Frenchman should be remembered as a pioneer in the sugar industry of Mauritius, one of the largest producers in the British Commonwealth. Among governors of the Île de France, as the French East India Company called Mauritius, this ex-naval commander (who showed his prowess when he captured Mahé from the British) laid the foundations from 1733 to 1746 for the future prosperity of the island. We see today how Mauritius, producing 350,000 tons sugar per year as well as other foodstuffs, has had varying changes of fortune since the French came in 1715 after the Dutch abandoned what the Portuguese first discovered. De la Bourdonnais not only made roads, built forts, and founded the capital, Port Louis, but cleared forests for cultivating cotton, indigo—and sugar.

The British had to capture in 1810 this thorn in the path of our Indiamen; yet Mauritius has retained many French customs and habits. But all prosperity centred on the sugar crop, one which, despite such vicissitudes as the beetle *Phytalus smithi* and the depression following high sugar prices and rosy prospects during World War I, has remained paramount. Napoleon III has gone down in history as champion of beet-sugar among other less useful deeds; De la Bourdonnais, "a man of eminent talents and virtue," should go down as the Frenchman prominently connected with cane-sugar in actual practice.

Fish Liver Oils

From the first experiments of Henry Crookes in 1911, which led to the formation of the Crookes Laboratories, a great organisation has grown which today is responsible for the production of well over one hundred preparations for use in clinical and veterinary medicine and pharmacy. This article describes the work of the research section and the production of liver oils at the Park Royal factory, London.

THE history of Crookes Laboratories can be traced back to 1911, when Henry Crookes, after some two thousand preliminary experiments, demonstrated the results of his investigations into the bactericidal action of colloidal metals before an audience at the Royal Institution. By the end of 1912, some colloidal preparations such as *Collosol Argentum* (colloidal silver) had been clinically tested and found to possess very valuable therapeutic properties. Further research followed in the use of colloids, both metals and non-metals, which led to the production in colloidal form of such substances as sulphur, iodine, gold, manganese, and calcium.

Activities of the Company

For the first few years the company's activities were restricted to the preparation of colloidal solutions for therapeutic purposes, but in 1931 they entered the nutritional field when the laboratories began intensive research into the possibilities of using halibut oil as a source of vitamins.

During these years the company were fortunate in having their scientific destinies guided first by Sir Malcolm Morris, K.C.V.O., F.R.C.S.E., and later by Sir William Pope, K.B.E., D.Sc., F.R.S., Professor of Chemistry at the University of Cambridge.

At the present day the Company's activities fall into two groups which may be classified as medical and nutritional. In both these spheres active original research of a long-term nature as well as that connected with day-to-day problems and developments is carried on. The laboratories were among the first to make sulphanilamide, stilboestrol, and phenytoin sodium for clinical use, and have led the way in developing the production and use of vitamin-containing oils.

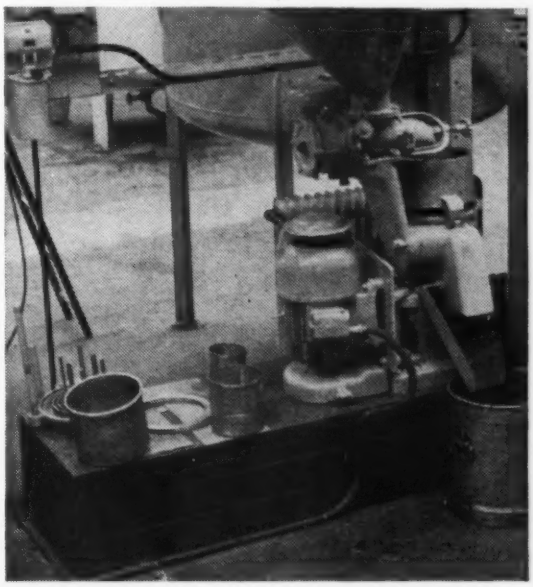
Vitamin Oils Department

At the Vitamin Oils Department at Park Royal the Crookes Laboratories refine and blend oils received from the fishing ports and overseas, and also operate a pilot plant for the extraction of oil from fish livers. Fish livers as brought into the ports vary a great deal, the condition of the liver as well as the oil and vitamin content being dependent upon such factors as season, age and condition of the fish, efficiency of preservation, etc. A proportion of the livers from each consignment is therefore worked up at Park Royal in a pilot plant and the process to be used on the large scale determined.

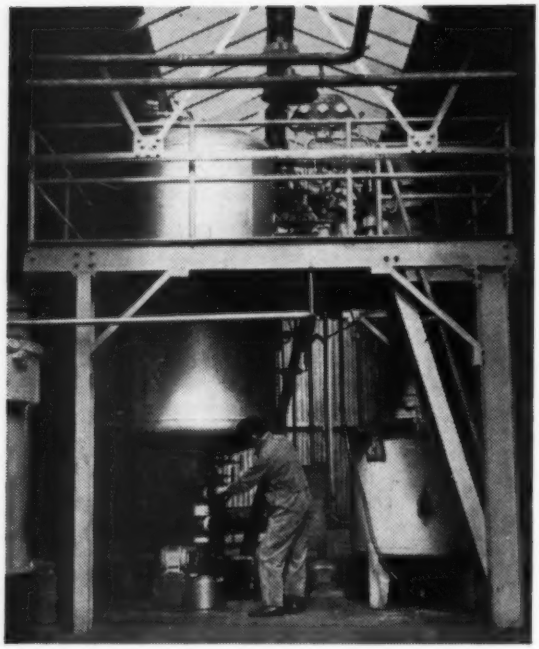
Broadly there are three classes of fish livers and three appropriate extraction procedures. Livers of high oil content, such as cod and shark livers, yield their oil easily, and treatment with steam in suitable digesters is often sufficient; livers of medium oil content, of which the halibut is the prime example, must be treated with special digesting agents such as dilute acids, dilute alkalis, or enzymes to release their oil; while livers of low oil content, such as tunny livers, are usually dried and solvent-extracted.

Mincing the Livers

The first step in the extraction of livers of high and medium oil content is to mince them. This is done in an electrically driven machine which reduces the livers to a homogeneous paste, and which can deal with ½ ton of livers per hour. The



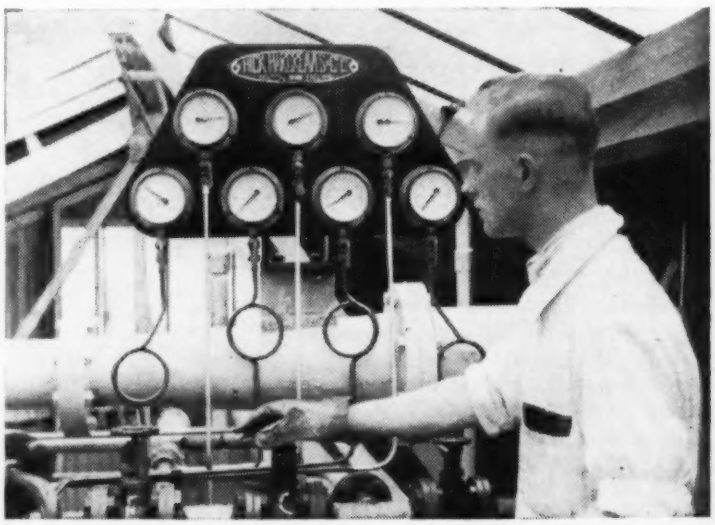
The livers are reduced to a homogeneous paste in the disintegrator.



The stainless steel deodorising plant.

next process varies very much with the type and condition of the raw material, but usually involves digestion of the suitably diluted paste with one of the agents mentioned above; this breaks down the liver tissue, releasing the oil which rises to the top of the mixture, either as free oil or as emulsion. This top layer is then run through a centrifugal separator to give crude fish liver oil. Such crude oils, together with similar oils produced elsewhere in England or imported as such, must undergo further treatment before finding their way into foods and medicines.

Neutralisation of any free fatty acid present is the first operation, and it follows well-known lines —the oil is warmed, caustic soda solution is added with stirring, and the soap formed is removed by centrifuging. As well as reducing the free fatty acids, this process improves the colour and appearance of the oil. Next the oil is filtered, possibly at low temperature to remove stearin, through filter presses of the conventional pattern, and finally it passes to the deodoriser. The Crookes Laboratories employ the usual deodorisation technique of steam distillation under vacuum; four steam injectors give a working vacuum of 1 to 2 mm. of mercury, and de-aerated superheated steam is blown through the oil contained in a stainless steel vessel of one ton capacity. At the temperatures employed vitamin A is very quickly oxidised if any air is present and strict control of the vacuum and steam de-aeration is necessary, since the smallest air leak might result in the destruction of thousands of pounds worth of vitamin.



At the controls of the deodorising plant.

Assay of Stock Oils

After deodorisation the oils are taken into stock. At this stage the product is fit for use, but is unstandardised; the oils vary greatly in potency from batch to batch, some being high in vitamin A and low in vitamin D, others perhaps the reverse, and so on. For commercial purposes a standard product is obviously required, and the stock oils are now assayed for vitamins, and characteristics such as iodine number, saponification value, etc., are determined. These data enable the composition of a suitable blend to be worked out for any given requirement, and the mixing of appropriate oils in appropriate quantities is usually the last stage in the production of material for sale or capsulation, although a further clarification and deodorisation is sometimes given.

Vitamin A Panel

It is important to note that the manufacture, use, and distribution of all vitamin A oils, as produced by the Crookes Laboratories, are carefully controlled by the Ministry of Food, Oils and Fats Division, under S.R. & O. 810, 1941.

The United Kingdom does not produce sufficient vitamin A to meet the necessary requirements of

the food and pharmaceutical industry; large quantities are purchased from many parts of the world by the Ministry of Food, who are the sole importers of vitamin A oils.

These imports, together with home production of oils containing over 5,000 I.U.A. per gram, are distributed by the Ministry through the Vitamin A Panel, a body of chosen members of the food and pharmaceutical industry.

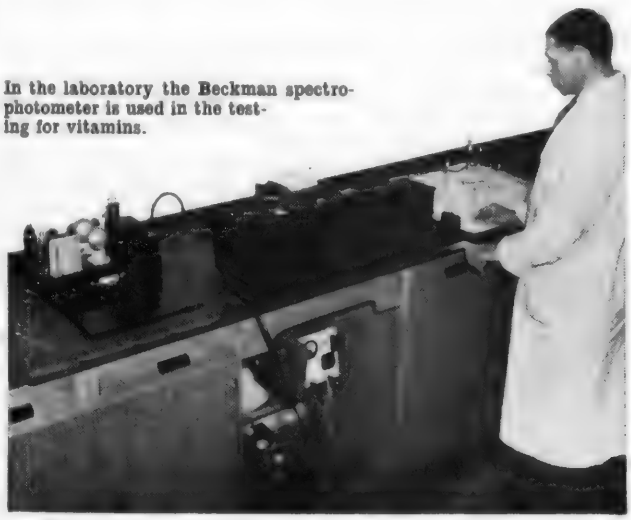
In the blending department.

Testing for Vitamins

Vitamin A can be assayed in several ways, the first and most fundamental method being the biological. In essence a biological assay is performed by feeding young rats on a vitamin A deficient diet until they cease to gain in weight and then giving some groups known amounts of vitamin A and others known weights of the substance under test. Comparison of the subsequent increases in weights of the various groups enables the vitamin A content of the test material to be determined. The procedure is lengthy, expensive, and not particularly accurate, and is not now used for routine assays, although it is still important in research. For the routine testing of fish liver oils and foodstuffs two methods have been elaborated. The first depends upon the fact that vitamin A reacts with an excess of antimony trichloride to give a blue colour of which the intensity is proportional, within certain limits, to the amount of vitamin A present, while the second takes advantage of the fact that light of a certain wavelength is absorbed by vitamin A in solution, the amount of light absorbed being a measure of the strength of the solution.

Suitable chemical or physical assays for vitamin D in fish liver oils or pharmaceuticals are not yet available, and except when dealing with almost pure vitamin, recourse must be had to biological methods. It is interesting to note here that there are several compounds having vitamin D activity, the most important being known as vitamin D_2 and vitamin D_3; while the first is active in mammals but not in birds, vitamin D_3 is effective in birds as well as in rats, dogs, and, of course, man. Two standard assays have therefore been devised, a rat assay for vitamin D_2 and a chick assay for vitamin D_3, and if it is desired to determine the amount of both forms of the vitamin in, for example, a fish liver oil, both assays must be carried out.

In the laboratory the Beckman spectrophotometer is used in the testing for vitamins.



In the vitamin D_2 assay the young rats are put, at weaning, on to a diet which is deficient in vitamin D, although adequate in all other respects. Under these conditions the rats develop rickets, the course of which is followed by routine X-ray examinations. At a suitable stage several groups of animals are fed with varying doses of a standard vitamin preparation, while other groups are given similar graded doses of the preparation under test. These additions enable the rats to lay down fresh bone and thus a cure of the rickets is effected which depends in degree upon the amount of vitamin ingested. The degree to which new bone has been laid down has to be carefully determined for each

rat, and this is done by examination of X-ray photographs and by dissection of the radius and differential staining of the new bone with silver nitrate. The "cure" of each rat is expressed by a number on an arbitrary scale, and statistical treatment of the "cures" of the rats in the various groups enables a measure of the vitamin D_2 content of the material under test to be obtained. Complete accuracy is not possible in a biological assay, and as well as the nominal result it is usual to give the limits between which there is a 95 per cent. chance of the true result falling; this is easily done by a further statistical treatment. The chick test for vitamin D_3 follows similar lines and the result is worked out in the same way.

Supervision and maintenance of the animal house (which is fitted with equipment for air conditioning and temperature control) call for much skill and experience. Fifty rats or one hundred and twenty chicks are used in each assay, and the large number of animals present at any one time—there are at present upwards of 2,000—have to be kept in good health and made available as tests are required.

SUPPLIERS OF EQUIPMENT

Beckman spectrophotometer: *National Technical Laboratories, California, U.S.A.*
Blending tanks: *G. A. Harvey and Co. (London), Ltd.*
Centrifuges: *Alfa-Laval and Co., Ltd.; Hopkinson, Ltd.*
Deodoriser: *Hick, Hargreaves, Ltd.*
Liver disintegrator: *Alfa-Laval and Co., Ltd.*
Mixers: *L. A. Mitchell and Co., Ltd.*
Stainless steel containers: *George Cohen, Sons and Co., Ltd.*

Vitamin Losses during Pea Processing

THE National Canners' Association and the Can Manufacturers' Institute have sponsored surveys of the nutrient content of canned foods (*The Canner*, **108**, 17, 1949).

One of these, carried out by J. C. Moyer, W. B. Robinson, and Z. I. Kertesz, N.Y. Agricultural Experiment Station Staff, has been devoted to an account of the vitamin C losses found when peas were scalded in water at different temperatures and for varying periods of time. In selecting the peas for these experiments, care was taken to obtain as representative samples as possible.

After grading, the peas were washed and divided into 30 lb. lots and held at 32° F. or until each lot could be blanched. Analyses of the washed raw peas held at cool storage for periods as long as four hours showed that none of the vitamin C content had been lost.

The actual blanching was done in a small rotary water blancher, and after discharge from it, the peas were cooled on a moving wire belt under sprays of cold water. The cooled peas were collected in regular factory buckets and held at room temperature. Vitamin C analyses were made immediately after the samples emerged from the spray cooler and after different holding times.

The purpose of the holding periods after blanching and cooling was to note any enzymatic destruction of the vitamin C that might have been started by the immersion in hot water and not stopped because of insufficient heat penetration. The actual blanching temperatures used in this study ranged from 160° F. to 210° F., and the blanching times from one to seven minutes.

The results of the vitamin C analyses show that the losses of this nutrient are due to the leaching action of the hot water and to enzymatic destruction. Which of these agencies caused the greater loss was estimated by observing whether or not this loss persisted during holding. Where the destruction persisted in holding after blanching, enzyme action was considered to be the chief cause of vitamin C loss.

The losses of vitamin C due to enzyme action varied with the blanching temperature. When low blanching temperatures were used, as, for example, 160° F. for one minute, the ascorbic acid losses were especially severe. At higher temperatures the vitamin C loss was much less after blanching, no further losses were noted on holding, and it was concluded that the losses were due to leaching only. These leaching losses of vitamin C were found to vary with the length of the blanching time, and further increases in the blanching temperature had little effect on the extent of the loss.

Considering blanching only from the standpoint of preventing losses of vitamin C, a short, high-temperature blanch yields more nutritious peas.

Machineable Bread Dough

THE making of a good machineable dough was the subject of a paper presented by A. R. Lumpkin at the twenty-fourth annual meeting of the American Society of Bakery Engineers. The necessity of proper ageing of the flour at the right temperature was stressed and, according to the speaker, the sponge dough method is more advantageous than the straight dough method as it has greater tolerance in handling with less chance of being punished through the equipment. It is not the best policy to overload the dough with an excess amount of water, as this may lead to over-mixing for the right development. It will also bring about stickiness and demand too great an amount of dusting flour to get it through the machine. Doughs to be run on a cross-grain moulder require slacker doughs with longer floor time for the best results. Other important points included the proper adjustment of moulding machine heads and the need for time temperature control.

Dried Mashed Potato Blocks

M. INGRAM, M.A., Ph.D., and O. de ROUSSET-HALL, M.A.

Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge, and Department of Scientific and Industrial Research.

Blocks, suitable for reconstitution with hot water to give mashed potato, can be made from commercial mashed potato powder, but are satisfactory only if fat is added. Milk powder and salt may also be included, if desired. Although the blocks can be made by compression, it is simpler to mould them; and sufficient fat can be added to make this feasible, without spoiling the flavour of the final mash. The storage life of such blocks is long at normal temperature; but under warm conditions it is reduced to a few weeks, especially if wrapped in fat-permeable materials.

THE recent appearance of a commercial supply of dehydrated mashed potato powder[1, 2, 3] makes it appropriate to publish the results of experiments on the fabrication of this material into blocks which were made in 1943 for the Supply branches of the Services. All such products are amenable to treatment in the same way, provided that the potato cells are intact so that the starch grains are undamaged, and the water content is less than about 10 per cent. Potato flours prepared by grinding dried potato are unsuitable, although they can be manipulated similarly, as they give mash with a slimy texture due to gelatinisation of the free starch.

Fabrication into Blocks

In the normal form, with 7 per cent. to 8 per cent. moisture, mashed potato powders are dry and will not cohere.

By raising the water content above 15 per cent. and using high pressures (5 tons per sq. in.) in a hydraulic press, it was possible to make fragile blocks of the powder alone. These were, however, too weak, so wet as to have a short storage life, and were liable to attack by mould. A similar alternative was to mix with 10 per cent. of a concentrated sugary syrup (confectioners' glucose or invert sugar) in a melangeur. This gave a powder sufficiently free-flowing to feed into mechanical presses, yet coherent enough to produce blocks which could be wrapped mechanically. Unfortunately because of the relatively high water content and large proportion of sugar, these blocks did not store well, especially at high temperatures, so this method of manufacture was abandoned.

Another alternative was to bind the powder with fat, and there was little difficulty in making tablets from mixtures containing this. In experiments with a mixture of the percentage composition: multicellular potato powder 60, spray-dried skim milk powder 22, deodorised cocoa-butter (m.pt. 29° C. to 30° C.) 16, and salt 2 parts, the relations, recorded in Table I, between pressure and density were obtained.

TABLE I

THE DENSITY OF POTATO BLOCKS MADE AT DIFFERENT TEMPERATURES AND PRESSURES (PERIOD OF DWELL 30 SEC.)

Pressure Applied (lb./sq. in.).	*Temperature (°C.).* 0	23	28	31
1,000 ..	1·05	x	1·00	x
1,500 ..	—	x	1·11	1·17
2,000 ..	1·09	1·06	1·16	1·20
2,500 ..	—	1·11	—	1·21
3,000 ..	1·12	1·14	1·22	1·21
4,000 ..	1·16	1·19	1·24	1·21
5,000 ..	1·19	1·22	1·26	—
7,000 ..	1·23	1·25	1·26	—
9,000 ..	1·25	1·26	—	—

x = blocks very weak.

The blocks did not relax appreciably after removal from the press. At temperatures below the melting-point of the fat the maximum specific gravity attainable was 1·26; at temperatures above the melting-point of the fat this density could not be attained, as fat was expressed from the block before it was reached.

The density of blocks prepared at a given pressure increased with the period of dwell, as shown in Table II.

TABLE II

SPECIFIC GRAVITY OF POTATO BLOCKS PREPARED AT VARIOUS TEMPERATURES AND WITH VARIOUS PERIODS OF DWELL (PRESSURE 2,600 LB./SQ. IN.)

Temperature (°C.).	*Period of Dwell (Min.).* 0	½	1	2	4
20 ..	1·08	1·11	1·13	1·15	1·16
28 ..	1·19	1·22	1·25	1·26	—
31 ..	1·22	1·21	1·21	—	—

The period of dwell gives time for the fat to flow between the solid particles, and the higher the temperature the more rapidly this occurs, but if the

TABLE III

THE RELATION BETWEEN TEMPERATURE DURING COMPRESSION, HARDNESS AT 18° C., AND SPECIFIC GRAVITY OF POTATO BLOCKS. HARDNESS MEASURED AS PENETROMETER READINGS

Type of Potato Powder.	*Temperature of Compression (°C.).*	*Hardness* at Specific Gravity.*				
		1·0	1·05	1·10	1·15	1·20	1·25
Unicellular:	0	—	3	4½	6	7	8
	25	—	—	5½	7	8	9
	Moulded at 35	—	—	—	30	—	—
Multicellular:	0	—	13	15	17	19	21
	28	15	17	19	21	23	25½

* Hardness was measured with a "penetrometer," a spring-loaded plunger, with a circular end, diameter 0·3 in. and convex radius of curvature 0·6 in. The figure recorded is the loading on the plunger in lb. weight at the moment when the block fractured. The instrument gives reproducible and comparable results if the load is increased gradually and if blocks of the same dimensions are always used (2 × 2 × 0·8 in. in the examples above). It is useful, however, only with materials which fracture suddenly, and not with those which undergo slow plastic deformation.

temperature is too high, the fat is expressed from the block and dwell is disadvantageous.

The strength of the blocks depended as much on the temperature during compression as on the magnitude of the compressing force. Blocks were, of course, weak while warm, as the fat was soft; but after cooling to a given temperature, blocks which had been pressed warm were stronger than those which had been pressed cold at equivalent density (Table III). This was particularly so if the temperature of compression was near the melting-point of the fat, since the fat then became much more intimately distributed between the particles.

The strength of the blocks increased with increasing density, but not markedly, strength being mainly a function of the rigidity of the fat. Mixtures with multicellular potato powder were stronger than those with unicellular powder, probably because of the interlocking of the irregular particles. The fact that the final strength of the blocks depended primarily on the fluidity of the fat showed the advantage of producing a continuous phase of fat to link the solid particles, and suggested that moulding would be preferable to compression for making the blocks, especially as it was found impossible to feed the fatty mixtures satisfactorily into automatic mechanical presses.

Moulding the Block

The principles of moulding have already been discussed in connexion with milk blocks;[4] it consists essentially in adding sufficient molten fat to powder ingredients to give a fluid mixture which can be cast or rolled without compression, and which will harden on cooling like chocolate. Obviously a rather larger proportion of fat is needed than for compression, and the best technique for shaping the blocks depends on this proportion. The amount of fat to give the required degree of plasticity depends also on the nature of the fat, and of the potato powder, and the temperature of operation; if, for illustration, one takes unicellular powder in cocoa-butter (m.pt. 30° C.) for manipulation at 37° C., appropriate proportions of fat are:

	Per Cent.
Hand compression	15-18
Rolling and cutting	18-22
Hand moulding	22-25
Casting	30-35

All these methods have been used, and they give blocks much stronger than those made by simple compression (cf. example in Table III).

The use of high proportions of fat is of course limited, because the material becomes too greasy, but on trial it was found that surprisingly large proportions of fat could be added without much effect on the palatability of the hot mash (Table IV). This permits the adoption of a variety of manufacturing procedures to suit different manufacturers and also a control of the calorific value which may be a valuable feature.

TABLE IV

APPRAISAL SCORES* OF A NUMBER OF RECONSTITUTED MOULDED POTATO BLOCKS

Per Cent. Composition.			*Average Score.*		
Mash Potato Powder.	*Spray Separated Milk.*	*Deodorised Cocoa-Butter.*	*Appearance.*	*Flavour.*	*Texture.*
60	—	38	3·4	3·3	3·6
65	—	33	3·0	3·1	3·5
68	—	30	3·2	3·2	3·5
71	—	27	3·2	3·4	3·6
82	—	16	3·2	2·9	3·4
60	22	16	2·8	2·9	3·0

* *Note.*—In this Table (and in Table VII) the scores were awarded by a tasting panel on the following basis: poor = 1, fair = 2, good = 3, excellent = 4.

Variation in Formula

Although, for use as a hot mash, the proportion of fat can be increased to 40 per cent. without loss of palatability, for several reasons it is better not to use more than 30 per cent. With more than this the block looks grey and "waterlogged," and if the tablet is eaten dry (as may be necessary in war) it is greasy. Also, it helps reconstitution if the tablet is broken into small pieces, and with too much or too hard fat this may be difficult; it helps if the tablet is grooved.

Not only must the fat be stable, but it is important to choose a fat with a melting-point fitted to the conditions of use. Fats which have been tested are given in Table V.

TABLE V

VARIOUS FATS TESTED IN MASHED POTATO BLOCKS

	M. pt. (°C.).
Butterfat	ca.25
Deodorised cocoa-butter	29-31
Palm kernel oil	32-34
Hydrogenated groundnut oil	33-35
Hydrogenated whale oil	36-38
	40-42
Premier jus	45-46
Stearin	50-52

Those with m.pts. below 40° C. are too soft for use in the tropics, but if the m.pt. is above about 45° C. the fat is waxy on the palate; hence only a few fats are suitable for tropical use as chocolate manufacturers also realise; on the other hand, if the fat melts below 30° C. (as with butter), the blocks will be too soft even under the warm conditions of temperate climates.

The proportion of added milk powder can also be varied from 0 per cent. to 20 per cent. without seriously affecting palatability (see Table IV), although there is naturally an appreciable difference between a product with much milk and one with none—preference is largely a matter of taste. Only skim milk powder of good flavour should be used, as there is no strong flavour in the potato to offset it.

Seasonings should be added with discretion. Salt may be included, but pepper is undesirable as it gives rise to curious flavours in fat-bound blocks and other spices might behave similarly. The quantity of seasoning must be adjusted to suit the possible method of consumption; *e.g.* a block intended for reconstitution might contain 5 per cent. of salt, but it would be too salty to eat dry.

Storage Properties

Potato powders of such low moisture-content do not deteriorate seriously on storage, provided that they are not kept at temperatures above 25° C.,[5] above 25° C. browning is considerably accelerated, but the off-flavours are not very strong. With the blocks, therefore, the usual limiting factor in storage is the onset of oxidation in the fat. When hydrogenated fats are used, this often takes the form of partial reversion in flavour before normal rancidity develops. Oxidation of the fat, like browning of the potato, is greatly accelerated by warm temperatures, especially when these are coupled with the use of unsuitable wrappers. If wrappers are permeable to fat and the block becomes warm, the fat of the block spreads through the wrapper, where it oxidises quickly. If the wrapper is heavily waxed, the wax may mingle with the fat of the block, producing undesirable flavours.

Deterioration of Skim Milk Powder

Variation in water content, which does not greatly affect the fat and potato, becomes important if milk powder has been included. Skim milk powder deteriorates rapidly during storage if its water content rises beyond 4 per cent.,[6] corresponding to an equilibrium relative humidity of about 0·3; thus potato powder, to which it may be added, must not have more than about 8½ per cent. water (cf. Table VI), and on general grounds it is of course better if it is drier than this.

TABLE VI

RELATION BETWEEN WATER CONTENT OF POTATO AND SKIM MILK POWDERS, AND RELATIVE HUMIDITY OF ATMOSPHERE AT EQUILIBRIUM (E.R.H.) AT 15° C. (*Unpublished Data of R. Gane and H. J. Shepherd*)

E.R.H.	*G. Water* / 100 *g.*	
	Potato.	*Skim Milk.*
0·2	7·35	2·35
0·3	8·25	3·60
0·4	9·50	6·15

With these precautions, and a well-stabilised fat, such blocks should store satisfactorily for months at normal temperatures, as indicated by the experiments summarised in Table VII. In these experiments the blocks were prepared with deodorised cocoa-butter or hydrogenated whale oil (m.pt. 40° C. to 42° C.), and a duplicate series was prepared in which the blocks were humidified from an overall water content of 6 per cent. to 8 per cent. All these blocks were wrapped in heavily waxed paper, heat sealed, and contained in waxed cartons, which is not the best possible form of packing.

Effect of Increasing Water Content

Increase of the overall water content of blocks of formula B from 6 per cent. to 8 per cent. increased the E.R.H. from 0·46 to 0·48 (at 37° C.), but it was found that this had no appreciable effect upon the storage life within the period tested. The products incorporating whale oil deteriorated less rapidly than the corresponding products containing cocoa-butter, especially in the mixture incorporating milk powder; and although they acquired a slight beefy flavour, this is not serious in an article normally eaten together with meat. The inclusion of milk powder made deterioration slightly more rapid, as the blocks were wetter than is desirable when milk powder is included.

The rate of deterioration of all the ingredients was so much increased by raising the temperature to 37° C. that the blocks were spoiled after a few weeks (cf. Table VII), and they are therefore regarded as unsuitable for use under warm conditions.

TABLE VII

CHANGES IN FLAVOUR SCORES, DURING STORAGE OF POTATO BLOCKS PREPARED BY (*a*) MOULDING, (*b*) COMPRESSION. WATER CONTENT OF BLOCKS 6 PER CENT. BLOCKS RECONSTITUTED WITH 2½ TIMES THEIR WEIGHT OF WATER

Composition of Blocks.		*Average Initial Appraisal Score.*	*Weeks of Storage at*					
			20° C.			37° C.		
Fat Used.	*Formulae.**		4	8	16	4	8	16
(a) *Blocks made by moulding—*								
Cocoa-butter	A	3·1	−0·1	−0·1	−0·5	−0·5	−1·3	−1·8
Whale oil	A	3·1	+0·1	▫	+0·1	−1·0	−0·5	−1·2
Cocoa-butter	B	2·8	+0·1	−0·4	−0·1	▫	−0·6	−1·3
Whale oil	B	2·9	+0·1	0	−0·1	−0·4	−1·0	−1·0
(b) *Blocks made by compression—*								
Cocoa-butter	A	3·0	+0·1	0	−0·2	−0·7	−0·9	−1·5
Whale oil	A	3·2	−0·2	+0·1	+0·2	−0·8	−0·5	−0·7
Cocoa-butter	B	3·0	−0·4	−0·3	0	−0·8	−1·0	−1·2
Whale oil	B	3·1	0	−0·3	+0·1	0	−0·8	−0·9

* Formulae:

	A. *Per Cent.*	B. *Per Cent.*
Potato mash powder	60	82
Spray-dried skim milk ..	22	—
Fat	18	18

1 per cent. salt was added to the mixture before reconstitution.

Potential Uses of Potato Blocks

These potato blocks were used on a large scale by the Armed Forces during the war, especially for emergency and parachute rations, their handiness and ease of preparation making them very suitable for such purposes. Even under circumstances where there is a premium on weight and space, convenience is the principal gain from using them, for the density of the blocks (specific gravity 1·0 to 1·2) is not much higher than that of the powder (ca. 0·9), although they can be wrapped and packed more simply.

Another very valuable, if restricted, use for them has been in special experimental diets, for as the proportions of the ingredients, potato fat and milk, can be varied widely, and these represent broadly carbohydrate, fat, and protein, it is possible to manipulate the proportions of the latter without any apparent change in diet—the large quantity of potato eaten provides scope for this. The block form is also very convenient here, for it provides a readily measurable unit not likely to suffer indeterminate losses during preparation: these advantages are shared by similar blocks such as those previously described made from milk powder.[4]

REFERENCES

[1] Rendle, T., 1944, *Brit. Pat.* 566,167.
[2] Bar, P. J., 1945, *Brit. Pat.* 566,498.
[3] Burton, W. G., 1945, *Brit. Pat.* 566,828.
[4] de Rousset Hall, O., and Ingram, M., 1946, *Food Manuf.*, **20**, 331.
[5] Burton, W. G., 1945, *J.S.C.I.*, **LXIV**, 215.
[6] Lea, C. H., Moran, T., and Smith, J. A. B., 1943, *J. Dairy Res.*, **13**, 162.

This work was part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research, and is published with their permission. Miss A. Brabant-Smith supervised the tasting tests.

Bubble Gum

THERE has been a great demand in recent years for bubble gum—essentially an elastic base which allows for considerable expansion when a volume of air is introduced. Substantial bubbles cannot be blown so long as there is undissolved sugar present in the wad. Preliminary chewing is necessary to dissolve the sugar and to decrease the resistance by vigorous mastication. During this stage the wad becomes softer since saliva is absorbed and temperature increased to body heat.

In the past bubble gum has been made with various combinations of jelutong rubber, paracumaron resins, and plasticisers such as vaseline; today there are numerous synthetic bubble gum blends offered by organisations who devote their efforts solely to manufacturing prepared gum base.

Sheets of scored and flavoured gum are seasoned for a week. They are broken into individual pieces and placed in panning machines. These machines may be described simply as rotating drums equipped with blowers so designed as to deliver low humidity air. A solution of diluted commercial corn syrup and cane sugar syrup is added and the drum is set in motion until the pieces receive a uniform coating. A small quantity of flavour is then added and distributed. An addition of finely powdered sugar is made at intervals, and partially coated gum is removed and allowed to season.

A coating is gradually built up with sugar syrups, starch, and gum arabic, and dried rapidly by means of the blowers after each application. A final polish is given to the coated gum by rotating the pieces in drums lined with beeswax impregnated canvas. A good candy-coated chewing gum is uniform in colour and thickness, and possesses a clean satin sheen.—*American Perfumer.*

Quick Freezing Today and Tomorrow

It is a far cry from that day over 200 years ago when, according to the history books, Sir Francis Bacon first observed and recorded the preservative effect of packed snow on a freshly dressed chicken; or that somewhat later day when Lord Kelvin measured temperatures and the expansion of gases to give the lay world the fundamental law for producing mechanical refrigeration.

SINCE the advent of mechanical refrigeration, many thousands of tons of food of various kinds have been preserved simply by placing in low temperature storage. Slow freezing of this kind apparently prevented food from going bad, but it had obvious disadvantages. The food underwent undesirable changes in flavour and texture, and prolonged storage in the frozen condition caused further harmful changes.

In the late 1800s a modification of the then established cold storage procedure was introduced known as sharp freezing, using a moving current of refrigerated air. In some respects this was an improvement, but it brought additional problems. Then followed various types of brine immersion and atomisation systems, some of which were quite satisfactory for certain types of food.

Birth of Quick Freezing

It was not until after the close of the first world war in 1918 that the foundation was laid for the quick freezing of food as we understand that term today. While all kinds of romantic tales have been woven around it, quick freezing is only, after all, a very practical method for preserving not only the nutritional values of food, but also the flavour, the colour, the texture, and even the bloom of the product.

Top quality quick-frozen fruits and vegetables are fresh foods, sun ripened and matured on the vine or the tree and which at their very peak of perfection have then been harvested, processed, and quick frozen. Preserved in this way they retain the vitamin and nutritive values which heretofore had only been associated with the fresh product, picked and eaten in the orchard or the field.

Peas are submitted to the tenderometer test, which indicates the degree of maturity.

Quick freezing, by whatever method accomplished, can at best only retain and maintain the qualities present in the product at the time of freezing. The freezing function itself adds nothing, and no product preserved by quick freezing can be any better than that product was immediately prior to its subjection to the low temperature. The emphasis, therefore, must always be towards securing the very best quality of raw material to start with.

Selection of Suitable Varieties

The selection of the right variety of seed is of great importance. The garden pea may be taken as one example. The pea used for canning is, generally speaking, small in size with a high starch content. The market or garden variety of pea is usually large, dark green, and somewhat higher in sugar content. For quick freezing a type or variety that has a superior flavour and all-round quality, matures evenly on the vine, and gives a high yield per acre is required.

Testing of varieties is still going on in Great Britain for every item handled. It is a continuous

Peas are graded and sorted before packaging.

effort to produce the varieties of fruit and vegetables most suitable for the purpose.

The processor of quick-frozen fruits and vegetables does not as a rule purchase his fresh produce in the open market. He must know a lot more about it than can be learned in a quick visit to a wholesaler's office. He usually contracts specific acreage with growers and farmers in the vicinity of his factory. Under this contract the grower undertakes to plant the seed to be supplied by the processor at the time suggested by the latter. Throughout the growing period the grower receives periodical visits from the processor's field staff who advise and, if need be, instruct the grower as to when and to what extent cultivation of the crop is to be effected. As the crop approaches maturity the visits from the field staff become more frequent, and during the last day or two representative samples of the pods (if the product happens to be peas) are taken to the factory and given a tenderometer test which indicates within a tolerance the degree of maturity. Finally, the field man advises the grower that his crop is to be cut on a given date. Once the crop is severed from the vine or from the land, speed and still more speed in its handling becomes of paramount importance.

Factory Routine

The next step is processing. The ultimate quality of the product now depends almost entirely on the efficiency of the processor's organisation in completing without delay the cutting, threshing, transporting, and other processing routines, all of which must be accomplished within a matter of hours. In Bird's Eye's operations a forty-five minute transport shuttle service between the vining stations and the factory is maintained. Factory processing routines from the time the product is taken on the receiving platform to the carton filling and closing operations usually follow a pattern which in many ways resembles that employed in a canning factory and has come to be regarded as standard procedure. It is, of course, true that for certain operations specialised equipment, some of it quite elaborate and costly to build, has been devised. Such things as the care taken in carrying out these routines and the degree of supervision all have a direct effect on the ultimate quality and depend on the processor concerned.

Packaging is the next step, and in quick freezing this is of more than usual importance. The package must possess outstanding utilitarian qualities if it is satisfactorily to perform its prime function of protecting the product while in storage from its most active enemies, dehydration and oxidation, which thrive in low temperatures.

The package also carries the processor's name and trade mark, and should be regarded as an

From the conveyor the packed peas are placed on trays for quick freezing.

ambassador of goodwill which the purchaser will instinctively associate with what is best in quick-frozen foods.

No other single phase in quick freezing has been given so much research by so many different interested parties. Practically every carton manufacturer on both sides of the Atlantic is still seeking the ideal all-purpose quick-frozen food package.

Freezing Operation

The freezing operation comes next. Having taken such infinite pains in all preceding steps, the processor cannot afford to nullify his efforts by indifferent treatment at this stage.

In quick freezing the product is lowered very rapidly through the zone of maximum crystal formation, which is the zone between 32° F. and 25° F., so that the elements within the cell structure are disturbed as little as possible. This is of paramount importance if the product after defrosting is to be substantially as it was before freezing. The goal the quick freezer is seeking is to take a delicate product, which in its fresh state has a "season" of perhaps only a few weeks, process and preserve it in such a way that it may be stored for weeks, months, maybe years, and on being defrosted to find it substantially as it was when picked off the tree or vine.

There are several methods of quick freezing. Almost every year new theories, new ideas, and new applications of old ideas are put forward, each claiming superiority in some particular respect. This is precisely as it should be. The industry is so very new, it has developed so quickly, that it will be many years yet before the last word will be said in regard to any phase of it.

The methods most generally used at the present time are air blast, immersion (using a variety of refrigerants), and conduction. Bird's Eye Company uses conduction. Under this proved and patented method the previously processed and packaged product is placed between refrigerated plates where it is held like a sandwich under a controlled pressure. This pressure expels air in the package, reduces dehydration, and speeds up the rate of heat extraction.

The package itself offers a certain amount of insulation, but this comparatively slight arrestation of heat extraction is more than compensated by bringing the parts of the product into direct contact with each other and with the cold surfaces of the plates, permitting the heat to flow directly and rapidly from the centre of the product.

Constant Temperature Necessary for Storage

The next step after freezing is storage. Indifferent attention to the manner in which the product is stacked and stored most certainly impairs the quality and may cancel much of the care and attention given prior to this stage.

The packaged peas are placed in the quick freezer.

For the comparatively short time which the product remains in storage—say it averages six months—a steady temperature of zero degrees Fahrenheit is considered quite satisfactory for the majority of products. For certain varieties of fish, and, in fact, for any product with an unusually high fat content, lower temperatures are desirable. This point becomes increasingly important if the period of storage exceeds or is likely to exceed, say, four months.

For the majority of products, however, a steady temperature of zero degrees Fahrenheit is satisfactory. The operative word here is *steady*. Fluctuating temperatures adversely affect the quality of the stored product in a marked degree.

Distribution Problems

Then follows distribution, which poses problems that are not encountered with any other food. The always present necessity of deliveries arriving at the point of sale without an undue rise in the temperature demands, in the majority of cases, the use of either insulated or refrigerated vehicles.

Generally speaking it is recognised that transportation facilities and developments have not kept pace with the industry, although recent advances and innovations are now closing the gap.

The final step production-wise is to make the product accessible to the consumer. To do this the retailer must provide himself with a low tempera-

The outer containers are passed into the cold store.

ture cabinet in which the product can be maintained at zero degrees Fahrenheit until sold.

Most processors are prepared to provide the retailers with such a cabinet on varying terms, which may include a rental basis. The necessity for this, however, is becoming progressively less as manufacturers are increasing their output and selling equipment direct to the dealer.

The urge to produce a product of superlative quality is not exclusive to quick freezers. It is shared by every manufacturer of every kind of quality product. But every purchaser of a quick-frozen food, whether it be a fruit, or a vegetable, poultry, meat, or fish, knows what a "picked this morning boiling of green peas" should taste like, and if the quick-frozen product he buys does not measure up to this knowledge, he may with some justification be disposed to criticise, having regard to the quick freezers' claim that their method is the only practical method under which not only the nutritional values but also the flavour, the colour, the texture, and the bloom of the freshly picked produce can be preserved.

The success of any quick-frozen food processor in passing this test, which any purchaser can apply to his product, will depend entirely on that processor's strict observance of the various important steps already mentioned. It is during these steps that the quality of the finished product is being determined. Once determined, quick freezing will preserve it as no other known method can.

It is less than twenty years since the Bird's Eye Company pioneered commercial quick-frozen foods in the United States by offering for sale in Springfield, Massachusetts, a few hundred thousand pounds of fruits and vegetables. Last year the total commercial pack of all processors of quick-frozen fruits and vegetables in the United States is estimated to be somewhere in the neighbourhood of a thousand million pounds. This amazing growth in public acceptance of a new product in a country which is noted for the abundance, variety, and availability of all kinds of food, is doubtless the reason why the quick-frozen foods business is sometimes referred to as the wonder child of the food industry.

Growth of the British Industry

In Great Britain the frozen food industry is comparatively new. A very limited pack was produced pre-war, but commercial processing was entirely suspended during the war years. In 1945 a fresh start was made in a necessarily small way on account of the almost complete lack of every possible kind of processing, freezing, and storing equipment, and the equally remote possibility of getting early deliveries of such equipment from the manufacturers. The situation in this respect is rapidly improving, at least for some types of equipment, and as a result production of quick-frozen foods is now expanding by leaps and bounds.

Turning to the marketing side of quick-frozen foods, it has been found that the British consumer is very quick to appreciate and welcome this addition to the general diet. It is recognised, however, that foodwise we are passing through what we all hope is an abnormal period. In attempting to predict what may lie ahead, a parallel may be drawn between the ups and downs of the industry's growth and development in Great Britain and those in the United States and Canada.

Difficulties of Meeting Demand

For the first year or two American and Canadian retailers, with some notable exceptions, were rather suspicious, if not openly antagonistic. This was true to an even greater extent of the general public. Gradually the genuine merit of these new foods earned them a regular place on the consumers' shopping lists. Then for a time processors found themselves unable to meet the increasing demand. New processors were attracted, some of whom had very little technical knowledge or experience, but who did have the mistaken idea that this was a "get rich quick" sort of business. They jumped in to meet a demand for what they completely

failed to appreciate was for a quality product. The multiplicity of brands and the tremendous variations in quality caused confusion in the public's mind. Consumers had to learn the hard way that because an article was described as being quick frozen, this did not automatically mean a product which would recall their recollections of the fresh article.

Item Spread

Consumers became more discriminating in their purchases. They bought not merely frozen foods but demanded a specific brand, one they could trust. The "get rich quickers" among the new processors had a very bad time, and either improved the quality of their products or went out of business. The quality processors once more found themselves facing the problem of meeting a demand for their products in excess of their production facilities. The industry may go through a similar experience in Great Britain.

The industry's experience in other countries may be repeated in Great Britain in another aspect—what in the industry is called "item spread," under which consumers gradually increase the spread of their quick-frozen food purchases over an ever-widening number of products. Every quick-freeze processor, every wholesaler and retail dealer in frozen foods, whether he realises it or not, is vitally interested in item spread, and should be prepared to use his influence in bringing it about as was done in other countries.

Almost without exception the first quick-frozen product which a new customer buys is a packet of peas. If that packet of peas has been quick frozen with due regard to each of the processing steps already described, it is probably a first-class product and there is a 99 to 1 chance that the frozen food industry has found a new repeat customer. She will enjoy the new food and tell her friends about it, all of whom will sooner or later get the impulse and will themselves buy a packet of quick-frozen peas, and so the good news spreads.

Expense Distribution

It is unfortunate that it is not possible for the industry to accept that situation and proceed to pack unlimited quantities of a product which has such universal appeal and consumer acceptance. The reasons why not are obvious. The fresh pea season lasts, say, four weeks, but a quick freezer must keep his factory operating for a much longer period—twelve months if possible. The only way this can be done is to quick freeze other products as they become available throughout the entire growing season.

It is by spreading expenses in this way, as well as reducing them by greater all-round operating efficiency, that the industry can hope to achieve its ambition to lower the price of all products to a level which will appeal to the greatest number of customers.

As has been intimated, the industry in Great Britain must solve this problem in the same manner as was done elsewhere. It is obvious that having been packed, these miscellaneous products must be sold. The processors, wholesalers, and retailers, all vitally interested, got together and spent time and money in a consistent advertising campaign passing along to the consumer the information that quick-frozen asparagus, strawberries, spinach, beans, raspberries, corn, broccoli, etc., were also available and would be equally acceptable by the customer if she would only try them once. The results were gratifying and in some cases surprising. Spinach is an excellent example. This vegetable is available for processing early in the spring. It ranks high in nutritive value owing to its exceptionally high content of ascorbic acid. Preparation in its fresh state by the consumer is a tiresome and laborious job, and spinach lends itself admirably to quick-freeze treatment. But spinach was not popular. As a direct result of this well-planned educational effort, this vegetable in the U.S. now ranks close to the top in terms of sales volume and consumer popularity. The consumer who at one time only bought peas regularly is now evidently buying spinach regularly. There are many similar illustrations of ways in which item spread has been achieved, and it is to be hoped that the British industry will enjoy a similar experience now it has started.

Blazing the Trail

In still one other respect the retail side of the quick-frozen food industry in this country may follow the trail which has been blazed elsewhere: by adopting a more intensive selling effort at the point of sale, the retailer's low temperature cabinet. At the present time in the comparatively few shops where they are available, the public is buying frozen foods on impulse rather than as a result of any special sales effort on the part of the shopkeeper or his assistants. The time is rapidly approaching when the shopkeeper and his staff will find it advisable, in fact absolutely necessary, to talk about his merchandise and make helpful suggestions to customers. Some retailers are already very much alive to this. They realise that conditions are changing and that the time is running out when they can stand at the cash register and ring it up as the queue files past. Some of these progressives with an eye to the future are already making new friends and repeat customers by introducing them to quick-frozen foods. They enjoy doing it because everyone likes to be the bearer of good news.

It is possible to quick freeze almost anything in the food line. In Bird's Eye and associate labora-

(*Concluded on page* 312)

Pioneers of Fertility

WITH Sir John Boyd Orr recently reminding us of a coming world food crisis—a warning accentuated since Sir Daniell Hall and Malthus in their periods predicted the time when over-population would outstrip food production—it is refreshing to come across a slim volume* looking back on all those men, chiefly British, who improved agriculture, particularly during the last 200 years. "The history of agriculture is the history of man trying to find means of keeping the soil in good heart while continually taking food from it," writes the author in an opening chapter. We are reminded later that Lawes extended this, aiming to increase the soil's yield beyond its natural yield without impoverishing it. We are given, too, a picture of earliest attempts at cultivation—in contrast to the darker side, the reminder of how nomadic Arabs sowed, reaped, and passed on to new pastures. "Babylon and Persia, Assyria and Egypt failed primarily because they failed to understand the basic principles of agriculture."

Early Workers

After such an opening we come to the pioneers, to a succession of men from Fitzherbert of Norbury and Thomas Tusser to the even more practical pioneers from 1770, men like Lawes and Gilbert and Warington who did so much to bring a high standard to British agriculture. Why Fitzherbert and Tusser, one may ask, among pioneers of fertility? Because Fitzherbert of Derbyshire, pioneer of fertility by fallowing, wrote *The Boke of Husbandry*, the first (in English) concerned with instruction in farming; because Tusser wrote the only complete farming book in verse. Verse, or doggerel if you like, but lines saluting no sunrise nor flowers in the hedgerow, verse having an eye to good muck and good crops, to "keeping his land in good heart and his cattle fit," to cultivating corn, peas, saffron, and hops, and to foddering cattle in winter

> Serve rye-straw first, then wheat-straw and pease,
> Then oat-straw and barley, then hay if you please.

The author has not ignored the laboratory side in these beginnings. Though almost entirely concerned with British pioneers, there is attention given to Liebig, the theorist, as well as to Lawes with his more practical field trials. There is none of that excessive patriotism which tends to ignore how Lawes really followed the ideas of Boussingault, that versatile Frenchman who, while Lawes was a mere youth, began field trials on his farm in Alsace. Yet Boussingault made but brief trials; Lawes with his persistence and thoroughness made Rothamsted.

With the inclusion of men concerned with theory we expect to find Humphry Davy's name, if only because of his lectures for the Board of Agriculture and his belief in "manures of mineral origin, or fossile manures." Davy gets a chapter, a Davy not so querulous as he could be in pure chemistry, a Davy who saw possibilities in Peruvian guano, in the use of straw in manure, in the chemical side of agriculture.

Then, in a later chapter, we can compare what Justus von Liebig had in mind with his theory of plant nutrition, one which "came like a thunderbolt on the world of science," as Sir John Russell put it. Liebig's dissertation in 1840 told how the absence of one necessary constituent from the soil would bring barrenness, even though other essentials were abundant. Yet Lawes found mistakes in Liebig's patent manures (containing no nitrogen, since Liebig insisted that plants could obtain their nitrogen from the air).

It is all very absorbing to hear again of this "nitrogen controversy," of how Liebig stuck to his mistaken idea and remained ever critical of the Rothamsted experiments. And yet, let us believe that Liebig, chemist with no farming experience, no doubt gave some inspiration to Henry Gilbert and Augustus Voelcker who attended his lectures at Giessen. Voelcker, it may be remembered, though a German, became consulting chemist to the Royal Agricultural Society after coming to Edinburgh in 1847 as assistant to a Scottish agricultural association, and continuing at Cirencester in the chair of the Royal Agricultural College.

Absorbing, too, are the recollections of Robert Elliot, who inspired Sir George Stapledon, who yet had such peculiar views as to call turnips and cereals "our two great enemies." Elliot believed in a system of "rouen and foggage"; rouen signifying aftermath on which no stock would be turned until spring, while "foggage," which Elliot believed more beneficial than hay, came from a whole year's grass kept until winter and spring to give a mass of withered and fresh green shoots. Such points as Elliot's grass mixtures at Clifton Park, which included his famous deep-rooting chicory and burnet, since Elliot was ever for tillage by agency of roots, add to the interest of this book of pioneers, a book admirably illustrated by Michael Ayrton, and one explaining why British agriculture should for quality be without peer.—M. S.

* *Pioneers of Fertility*. By Crichton Porteous. Pp. 125. The Clareville Press. Price 10s. net.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Scientific Information Services

SIR ALFRED EGERTON, M.A., F.R.S.
Professor of Chemical Technology, Imperial College of Science

Part I

Scientists have evolved in the course of years a remarkably effective system for providing themselves with information, but the system is suffering from strain and requires renovating and strengthening. There is a real job to be done. In the course of this lecture* there is presented what the needs are and in what way improvements can be made to meet them.

THE processes of organisation, storage, and flow of scientific information are becoming more and more complicated as science develops; and when the programme of the Royal Society's Empire Scientific Conference was under consideration in November, 1945, the time seemed to call for a discussion of the whole subject. During the conference in 1946 a meeting was held at Cambridge, but it was clear from the discussion at this meeting that the whole subject needed much more thorough consideration than could then be given to it. Therefore, the conference recommended that the Royal Society should convene at a later date a "special conference of libraries, societies, and institutions in order to examine the possibility of improvement in existing methods of collection, indexing, and distribution of scientific literature and the extension of abstracting services." This recommendation was supported by the official British Commonwealth Scientific Conference, which followed the Royal Society Conference, and the Royal Society was subsequently invited to organise a "Scientific Information Conference."

This conference was held last summer. It went well. Representatives from the Dominions and Colonies, and observers from the United States of America, attended. The whole subject had been divided into four sections, each with an editor, dealing with publication of papers, abstracting, library services, and reviews. The subject of each section had been further subdivided, and working parties formed to collect information and to study each separate subdivision.

The General Result of the Conference

The conference discussed but did not recommend drastic changes in the method by which the scientist produces and is provided with scientific information. It made, however, many recommendations with a view to improving existing methods. Some people have thought that in the course of time the volume of scientific literature might become so great that it would defeat its own purpose, but one of the conclusions of the conference was that there is little substance in this fear, provided the whole machinery by which scientific information is produced and distributed is modernised, kept in good order, and suitably renovated from time to time. This will, however, require much effort and additional expenditure.

Implementation of the Conference

One of the recommendations of the conference was that the Royal Society should be invited to form a standing committee to implement its findings. This committee, the "Royal Society Information Services Committee," has been working since October and the report of the conference was published before the year was out.

The conference has stimulated scientific societies and libraries to review their existing practices, and many have already taken steps to improve their services in the ways recommended: this is happening even as far away as in the U.S.A.

Production of Scientific Information

The history of the Royal Society's publications epitomises from the earliest times the development of scientific periodicals—Transactions, Proceedings, Abstracts, etc.—and underlines the close connexion between scientific societies and the production of scientific literature.

Although scientists publish the results of their work mainly as papers communicated to scientific societies, and therefore appearing in the Transactions, Journals, or Proceedings of those societies, there are also a number of other channels—proprietary journals, bulletins of industrial or government organisations, and periodicals relating to the professions.

A survey of the main scientific journals published in the Commonwealth was made for the conference. Seventeen libraries were asked to list twenty journals which publish mainly original work and which are of major importance in each particular field.

There are a great many specialist journals, but as

* *Abstract of a lecture delivered before the Royal Society of Arts on May 18, 1949.*

the net spreads wider, so the appearance of papers with new matter, new presentations, or critical discussion which can be considered as contributing to the amplitude of the wave of scientific advance becomes rarer, many of the articles being more concerned with spreading information about existing knowledge. The facts that, according to the later edition of the World List, there existed in 1937 36,000 periodicals devoted to scientific and technical subjects, and that the *Union Catalogue of Periodicals in University Libraries in the British Isles* made a great many more (about 20,000), are not really alarming, if the important papers appear in a *limited* number of easily accessible periodicals and if the others are sufficiently well sifted by the organisations responsible for abstracting and indexing.

It is of importance that as far as possible all new original scientific work deriving from the scientific manpower, increasing month by month, in our university, industrial, and government laboratories, should appear in the established journals, and that new journals should not be created without proper consideration as to whether existing journals cannot meet the requirement.

Style of Presentation

It is also of importance to the progress of science that the results of research work or the discussion of scientific problems should be presented in clear and concise language so that they can be as widely understood as possible. This does not mean that every paper must be written so that the non-specialist can grasp it; but it does mean that every specialist should be able to make use of it without difficulty and therefore make it intelligible to a wider number of scientists.

It has been urged recently that scientists and engineers should be educated so as to present what they have to write or say in correct "functional" style.

What Scientists want to Say

There are many different ways in which scientists wish to present their work:

(i) they may not only want to write up their work for permanent record as in the normal publication of a scientific paper;

(ii) they may want to let the world of science know what they are doing; or

(iii) they may be in a hurry to make known that they have made a discovery;

(iv) they may wish to bring together work carried out over a long period of years in the form of a memoir; or

(v) they may merely wish to describe in a general way the results of their researches, their methods, or their achievements;

(vi) they may wish to deposit detailed records, observations, drawings, etc., for future reference, and

(vii) they may wish to discuss or to review the work of others or to take part in symposia.

Many different channels are provided for these various purposes into which authors can direct their script, but it is not always easy for them to decide which they should choose. More information should be given them as to where they can best send their communications.

Reviews of Books

Reviews, however, must be mentioned. There are two main purposes of reviews: the first is to gather together and present the progress which has been made in a whole subject during a period of time or to review the state of knowledge in a particular branch of a subject. These objects serve the specialist rather than scientists as a whole. The second is to provide scientists with knowledge of what has been going on, not so much in their own field but in other fields. Both are important and both are needed, but the second is particularly wanted by the scientific public, those engaged not only in research and technology but also in administrating or teaching, and such reviews can be written appropriately for several levels of interest. The Royal Society of Arts provides valuable service in arranging the publication of their Cantor Lectures, which summarise some special branch of science.

Last year, at a meeting of the Society for Visiting Scientists, Sir C. V. Raman, a distinguished Indian scientist, expressed the hope that scientists would write more books. Not so much, probably, because he wanted to read them, but, as he described it, only by reassembling the information in the mind and in new associations does it become assimilated.

One is apt to overlook that while reasoning seems a conscious process, it depends on correlations within a subconscious mind. The mental processes of extraction and distillation of scientific literature, to use the metaphor of chemical technology, are of great importance to the advance of science. The greater the mind which carries out these processes, the more chance there is of effective results, though it is true certain types of mind have a special facility for such work.

The production of scientific literature can be summarised as follows:

(i) no undue multiplication of sources in which original work is published;

(ii) high standards maintained by the responsible scientific societies both in substance and in presentation;

(iii) co-operation to prevent diffusion of effort and complexity.

(*To be continued*)

Bacon Production in Denmark

COLLAN E. B. BRETT

Mr. Brett, well known as a bacon expert, gives his impressions of a visit to Denmark for the purpose of investigating the state of its bacon industry and of comparing it with that of Great Britain.

THE chief purpose of my visit to Denmark was to see for myself how she was setting about the restoration of her pig and bacon industry, and to compare the position with that of our home industry; but, in pursuing it, there was inevitably added to the canvas, bit by bit, so much of the all-important background to the main theme of the picture.

On the outward journey, crossing the country to Copenhagen by air in ideal weather, I was able to check up in a general way on the system of farming and to appreciate the intensity and thoroughness with which it is practised. The scene was a patchwork of tidy fields of fairly regular shape with an even spread of farmsteads and here and there a village gathered round a church.

First Impressions

My first impression of the farms from the air was confirmed soon after landing when I drove out of the great city of Copenhagen to study them at close range. Thoroughness was evident in all farming practice, and indeed is undoubtedly a national characteristic which must have much to do with Denmark's success as a producer and exporter of bacon and dairy products.

No one seems to have more land than he can farm well—or is it that he farms well what he has? The implements were in good order but mostly of pre-war vintage and horse drawn, and confirmed that, though the farms are not so highly mechanised as ours are now, they have been adequately enough equipped for rotational cropping for a long period, during which the general system has undergone little fundamental change.

The sturdy Jutland horse plays a valuable dual role; it not only provides draught power, but also bedding for mushrooms, a crop that finds a ready market.

The farm buildings on average are spacious, usually with lofts, and well constructed, giving adequate accommodation for livestock, crops, and machinery. Ventilation of cow and pig houses is particularly effective without undue loss of heat, a factor which must have an important influence on economy of production.

As is common knowledge, ley farming is the basis of the system, but what is remarkable about it is the high degree of perfection with which it is employed throughout the country. Waste ground and permanent pasture are conspicuous by their virtual absence.

In this almost flat, notoriously windswept country hedges are rare and, in the parts visited (Zealand, Fyn, and South Jutland) the woods, mainly beech, are never extensive. The absence of hedges did not seem as strange to me, a visitor from England, as might be imagined. Apparently the intensively practised ley system can be relied on to prevent soil erosion without the assistance of hedges; they cannot be justified merely as shelter for cattle, especially as throughout the winter the

Feeding pigs on a Danish farm.

Boning a carcass at one of Denmark's Co-operative bacon factories.

herds are kept housed day and night. With main electricity on every farm, electric fences are much more practical and economic.

The system of husbandry, and the policy of importing such feedingstuffs as can be had and be used to advantage, ensure high acreage yields, economy in cultivation and harvesting costs, and, withal, a decent level of income from limited acreages.

Soil Fertility

Wherever one goes, the high state of fertility of the soil is evident, and appears not to have suffered through the effects of the German occupation, which period, in a direct financial sense, was actually one of agricultural prosperity. The Germans, it seems, had a wholesome respect for Denmark's ability to produce good food, and they paid the farmers well. This was quoted as an example of German stupidity in that many of the fortunes made were devoted to sabotage and underground resistance. But when the subject was broached at all, the Danes I met spoke only of their friends' heroism, never of their own. Modesty is surely another national virtue. The Danes much preferred to draw attention to the achievements of the Royal Air Force. Here, at least, the people give Britain full credit for having saved their ancient kingdom from obliteration by the Nazis. With such appreciation of our war effort, small wonder that this naturally hospitable people seem to take special pleasure in welcoming a visitor from Britain.

Nowadays in Denmark, in contrast with our own lingering war scars, no material evidence of war destruction is evident.

As we motor through the country along good though rather narrow roads, we call without previous notice on a cross-section of the farms, and, large and small, without exception, the farmers make us very welcome. In their homes we find every reasonable comfort; all are clean and orderly, adequately furnished, and centrally heated; and, to prevent loss of heat, more often than not they are fitted with double windows.

There is no boastful attitude as the farmer shows you his livestock, dairy cattle, pigs, horses, poultry, and the rarer sheep. Yet all are found to be in excellent condition, even though, with the exception of the few sheep and the horses when working, all have been housed day and night through the winter months. Most milking herds are large compared with ours, and the skim milk returned to the farms by the dairies is put to good use, particularly in the feeding of pigs.

Pig Production

The type of pig is so standard through the country and so uniform at all stages of growth that it needs to be seen to be believed. Though our Large White breed is the nearest approach to it, most strains need further development to attain such perfection for bacon purposes. The Large White breed is highly thought of by the Danes, and they contend that when the male is crossed on the native breed earlier maturity results.

Amazingly there was the odd coloured pig, but it was very, very rare. Would it have strayed over the border?

The feed used throughout consists almost entirely of skim milk, barley, and cod liver oil. Potatoes are also being used, though not, it seemed, extensively; it was interesting to note that they could be bought ready cooked. They were often clamped or ensiled indoors, convenient for feeding. Helped by imported feedingstuffs, production of pig meat is increasing rapidly—it was said that slaughterings would be doubled in six months.

The smaller farmers buy store pigs from the comparatively few large breeders, and eight to ten week old pigs appeared to be costing about £6 to £7, which is at least twice as much as current prices at home. With the excellent diet and good housing, they are ready for slaughter in the sixth month. Three times a day feeding is the rule, the exception being with "swill" feeding, when twice a day feeding is the practice.

It occurred to me that people like the Danes would put kitchen waste to some practical use, but I found their outlet was no more novel than ours—it went to the pigs. But even the large farmer who

uses most of the waste collected from København freely admitted that the carcasses were not suitable for export. When the young pigs had been given a good start on a normal diet, "swill" was gradually introduced until nothing else was fed. They were fed on to heavy weights and conformation did not suffer. The quality of the "swill" was superior to ours, except that it contained a good deal of fish which caused more taint in the meat than we get on average. The premises were almost as wholesome as if cereals and not waste were used for feeding.

Pigs are delivered to the bacon factories usually by the farmers themselves and often in lots of only two—a bacon factory might have 8,000 local members so that an average annual delivery of a little over six pigs per member would supply a weekly killing of 1,000.

A flat price is paid for pigs of all weights, but pigs for export as bacon to England are selected by eye, roughly in accordance with pre-war standards. About 50 per cent. are suitable, but the remainder are superior in quality to the general run of our heavy carcasses and are not inclined to over fatness.

Bacon and Sausage Factories

The factories visited are all well equipped, and in the main use much the same types of machines as ours. The machinery was generally in very good condition. White glazed walls, yellow tiled floors, and plenty of windows are the rule, and combine to give an impression of cleanliness. The use of oil fuel for raising steam also helps in that direction.

In all three bacon factories visited only one woman was employed other than for clerical duties. Neither is female labour used in the sausage factories.

As compared with our factories more labour per production unit appeared to be used, and I thought this to be due mainly to the desire to attain perfection in every detail. Indeed, this thoroughness was striking in all spheres of production from farm to market.

Other Farm Products

Besides bacon, eggs, and milk, Denmark produces most of the vegetables and fruit she consumes. But her soil is not devoted entirely to the production of essential foods. Tobacco is another important source of income to the general farmer, and the home consumption, which appears to be heavy, is supplied almost exclusively by the home crop. The thatched tobacco curing houses have become a feature of the landscape.

The Dane also loves flowers, and nurserymen-farmers produce for the home and the export markets a variety of the choicest blooms, most of them known to this country. Though by no means cheap in February, the time of my visit, flowers were to be seen in the humblest of homes. Not that any were humble in the sense of being in poor circumstances. We see no poor, and we find that the old are well cared for, if necessary by the State. Denmark, it would appear, has a better understanding of the principles of democracy, and applies them more genuinely and successfully than most other professing democracies. The realisation of this is pleasantly reassuring to the visitor who believes in democracy but has not before seen it applied so effectively. The average standard of education is high, the result of over a century of compulsory education, and this no doubt explains why the people are so consistently level-headed. This we find is a happy, well-fed race, which knows how to live, and, on all counts, fully merits the right to go its way in peace.

The point that impressed me most in this attractive little country was the patient, almost stubborn, attention to detail, even at the cost of high labour usage, beginning with the farmer and continuing right through the process of manufacture and of marketing. It was as though it would be a reflection on the individual as well as the country if anything but the best were exported, especially to England.

The free exchange of information with those I met in industry was most refreshing, and indicated that the Danes have great confidence in the British, which I feel we should always do well to honour to the best of our ability.

Bacon pigs at a Danish Co-operative bacon factory.

Ministry of Food

Latest Statutory Instruments

The list given below is the continuation of the list of Orders published in *Food Manufacture*, June 1, 1949, page 248.

No.	*Date.* 1949.	
		PRICE FIXATION
878	May 6.	Order amending the Butter (Control and Maximum Prices) Order, 1947.
879	„ 6.	Order amending the Cheese (Control and Maximum Prices) Order, 1948.
		FEEDINGSTUFFS
813	May 1.	The Feedingstuffs (Rationing) (General Licence) Order, 1949.
		OILS AND FATS
894	May 22.	The Oils and Fats Order, 1949. Revokes S.R. & O. 1946, No. 2042 and 1947, Nos. 557 and 2840; S.R. & O. 1944, No. 672 and 1947, No. 701; S.R. & O. 1946, No. 2043; S.R. & O. 1943, No. 1767 and 1947, No. 2841; S.R. & O. 1940, Nos. 1107 and 1415; S.R. & O. 1940, No. 898.
		POINTS RATIONING
542	Mar. 27.	Order amending the Food (Points Rationing) Order, 1948.
780	Apr. 24.	Order amending the Food (Points Rationing) Order, 1948.
		VEGETABLES
473	Mar. 23.	Order amending the Carrots (General Provisions) Order, 1944.
694	Apr. 10.	Order amending the Canned Fruit and Vegetables (No. 2) Order, 1946.

Egg-shell Biochemistry

A DESCRIPTION of the digestive and egg producing systems of the hen was given by Prof. C. Tyler at a meeting of the London and South Eastern Counties Section of the Royal Institute of Chemistry. The laying hen has a very intense calcium metabolism, and the biochemical aspects of egg-shell formation are of great interest.

In contrast to a non-laying bird, the laying bird retains more calcium from her food, this increased retention beginning about ten days before laying commences. On days when an egg is laid, the bird retains about 1 g. calcium from her food and mobilises about 1 g. from the bones in order to provide the 2 g. necessary for the shell. This bone mobilisation results in a simultaneous liberation of phosphate which the bird excretes. On days when an egg is not laid, the bird again retains about 1 g. calcium from the food and this is deposited in the bones. Thus the balance of calcium in the body will be dependent upon the proportion of laying to non-laying days. The very heavy layer appears to be capable of retaining more than 1 g. calcium per day and, at the same time, she lays thinner shelled eggs.

The blood calcium and phosphorus levels in a laying bird are higher than in a non-laying bird and, in addition, a readily mobilisable store of calcium is found impregnating the bone marrow of the long bones. The increased retention of calcium, the high blood calcium, and the special bone picture of the laying bird are all closely related to the supply of sex hormones circulating in the blood.

In the shell gland the calcium and carbonate ions are precipitated as calcium carbonate on the shell membrane and carbonic anhydrase is important in this reaction.

The shell consists chiefly of calcite and protein. There is a layer of calcite granules next to the shell membrane, then a layer of more tightly packed, smaller crystals, and through this outer layer pores penetrate from the surface to the interstices between the granules. These pores enable gaseous exchanges to take place between the egg and its environment.

Low calcium diets cause a thinning of the shell, but after a few days laying ceases; on the other hand, high calcium diets may produce soft shelled eggs. Eggs which are often described as porous because of their chalky appearance are often far less porous than normal eggs.

Quick Freezing Today and Tomorrow

(*Continued from page* 305)

tories over a thousand different items have been successfully quick frozen. The pre-freeze processing technique or "know how" varies very considerably with different products, and in some cases years of research have been given to discovering the processing technique which will ensure the required quality.

In this connexion there was one particular product which it was agreed would have an enormous market, but for which, up to that time, a successful pre-freeze technique had not been found. That was ten years ago. Research on the project in many laboratories was never relaxed, and it was eventually successful. The product referred to is orange juice. Sales of this item in the United States are quite remarkable, exceeding the rosiest predictions. In some States it is even surpassing peas, which have held undisputed first place since the industry started. This type of research is going on continuously, and there are doubtless big developments just round the corner.

Abstract of a paper read by G. W. Muddiman, Chairman, Bird's Eye Foods, Ltd., before The Institute of Refrigeration at The Institution of Mechanical Engineers, London, S.W.1, on February 15, 1949.

The Canning of Anchovies

To assist in developing a steady and dependable fishery, still more biological data on the growth and habits of the anchovy in British Columbia waters are needed, and the Pacific Biological Station is continuing work in this field. Handling and processing methods require still further improvement ; investigations along these lines were commenced at the Pacific Fisheries Experimental Station in 1944* and are being continued. This article reports some observations made in assisting the local industry to develop a satisfactory anchovy pack.

THE anchovy (*Engraulis mordax*) of the Pacific coast belongs to the herring family, and since its average length is about 5 in., it is well suited for canning in a manner similar to that of the Norwegian sardine type of pack.

These fish are found in schools, feeding on plankton, along the Pacific coast from a little north of Vancouver Island to Cape San Lucas in Lower California, Mexico, and it has been stated that they offer the greatest remaining opportunity for increased exploitation of the commercial coastal fisheries. Estimates of the possible annual yield of anchovies for the coast run as high as 125,000 tons. Despite limited fishing for anchovies up to the present in British Columbia, 7,000 tons were caught along the coast of this province in 1941, and the value of the canned pack in 1944 exceeded a quarter million dollars.

Improving the Pack

British Columbia anchovies have a fine, delicate flavour, comparable to that of the best Norwegian brisling sardines. During the war, when packs of the latter were unavailable, British Columbia canned anchovies captured some of the markets for Norwegian canned sardines. However, with present resumption of packing in Norway, anchovy canners have felt the need for improving their packs to meet competition from the high-standard specifications of the Norwegian product. These specifications call for firm, unbroken fish; fish readily separable, not a solid block; no liquid other than clear oil in the can; and, what is of paramount importance, a pleasing appearance on opening the can. Specifications such as these may be met with or excelled in the canning of anchovies, for control by physical measurements is possible, but for the more elusive high standard of odour and taste canned anchovies stand on their own merits, for the British Columbia anchovy is not the same fish as the Norwegian sardine.

Anchovy canners on the Pacific coast have tended to use a method enabling them to process quickly and cheaply, but giving a product which at times compares unfavourably with competitive foreign packs. This method may be described briefly as consisting of scaling and washing the fish in a rotary scaler, then beheading and gibbing (removal of the viscera) by hand. They are next brined and smoked. After hand packing into ½ lb. oval cans, these are inverted and passed through a steam exhaust box; following return to the upright condition, the cans are filled with hot oil, sealed, and processed in retorts. The resulting product generally has a good flavour, but may at times possess one or more of the following faults: soft texture, broken appearance, a tendency to cling together in a mass, or an excess of unsightly liquid other than oil in the can (see A in illustration). Some of these faults can arise from the high moisture content of the fish, and after pointing out how this may be rectified, the whole process will be reviewed from the standpoint of possible improvements arising out of recent experiments at the Station.

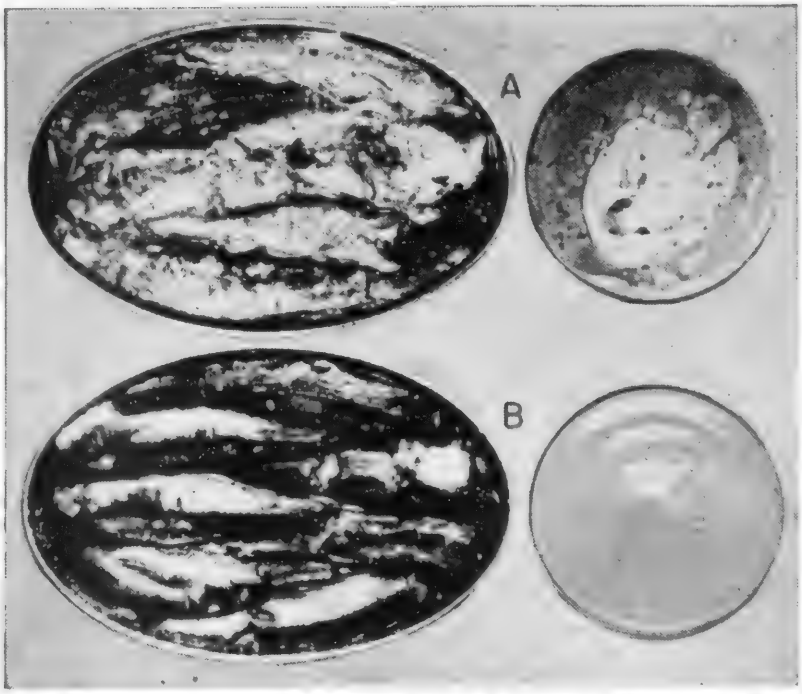
Drying Methods

There are four basic methods for the removal of surplus moisture in fish of this type: air drying, high temperature drying, oil frying, and steaming.

Air Drying.—This method has been used for processing anchovies by technologists of the State of Washington Department of Fisheries, and is published in their *Technological Report No.* 1 by C. L. Anderson and R. K. Pederson. The method was tested at the Station using the recently modified air-conditioned tunnel smokehouse and yielded a good product. However, since three hours are required for the combined drying-smoking operation, the construction of a large, well-designed drying tunnel is necessary before the method can be commercially applied.

High Temperature Drying.—This method is the one used in Norway for the preparation of the famous brisling sardines. It, too, requires much expensive equipment. Much of the success of the process depends on the fish being suspended on wires through the heads, so that there is no marking of the fish from trays as would occur at the high

* "Anchovy Products," *Progress Reports*, No. 63, pp. 41-42.



A—Top view of newly opened can of commercial pack of British Columbia anchovy, and of mixed oil and aqueous liquid poured out from the can into a glass dish.
B—Corresponding views of experiment pack of steamed anchovy, showing clear oil, but substantially no aqueous liquid.

temperatures induced within the drying tunnel. In addition, the Norwegian fish are held alive in "pounds" after capture to empty the stomachs prior to canning so that it is unnecessary to "gib" the fish; only the heads are removed for canning.

Oil Frying.—Most of the Mediterranean sardines are prepared by this method, and it has been used by the sardine packers in Maine. However, the high cost of frying oil makes the process uneconomical at the present time.

Steaming.—This method is in use in Maine and in Norway for the production of the "sild" sardines. It is a very rapid method for removing moisture and requires very little new equipment. Consequently, it was decided to conduct experiments to see if the method could be applied to the British Columbia anchovies. Numerous sample packs were prepared at the Station with excellent success. These experiments showed the following advantages:

(*a*) Speedy removal of large quantities of water from the fish. Test results showed losses averaging 25 per cent. of the weight of the gibbed fish.
(*b*) The product was of firm texture.
(*c*) The canned fish separated readily.
(*d*) The oil was clear and clean with very little water mixed with it.
(*e*) The flavour was mild and attractive.
(*f*) The fish could be packed to a final weight, a distinct advantage over the present practice of packing raw fish and having to estimate the losses in the exhaust box.
(*g*) The appearance (see B in illustration) was exceptionally good as compared with that of the commercial product (A).

Proposed commercial methods employing the steaming process, based on observations made at the Station, are as follows:

Scaling and Washing are performed very conveniently with a revolving screen herring scaler. The chief object of this operation is to remove dirt and loose scales. Scales remaining firmly on the fish may be left on without detrimental effects.

Gibbing is accomplished by hand with a knife or a small piece of sheet metal. The head is almost completely severed about ½ in. behind the gills and the knife pushed away from the body of the fish to remove, along with the head, the intestine, which is about 6 in. long. The removal of this intestine is most important, for if left in the fish it spoils the appearance of the product. If the fish are badly "belly burned" the gibbing cut should be made far enough back to eliminate the damaged portion. After the fish have been gibbed, an advantageous way of conveying the fish away from the tables is by sluicing. This removes the blood and slime and saves an extra operation.

Brining the fish is carried out for about ten minutes in saturated brine. There are many forms of mechanical briners which can be used to provide brining time.

Rinsing should be done immediately after brining, for the brine becomes very slimy from dissolved milts and other fish constituents. It can be achieved very effectively by water sprays directed on to the fish as they pass on a conveyor. The rinsing time must be short to avoid leaching out the salt from the fish, but large volumes of water should be used to remove completely all slime.

Steaming is carried out for about ten minutes at 212° F. The fish must be steamed on trays which can be placed in the smokehouse, as the fish are

too fragile to handle until the smoking-drying process has been applied. The steam chest can take several forms. It can be a retort, a standard exhaust box, or a chest supplied with steam headers, to accommodate smokehouse cars. The ideal method perhaps is a continuous smokehouse with wire-mesh conveyor belts, with the belts first passing through a steam chamber. The fish must always be spread thinly enough on the trays to allow air circulation during the smoking-drying process. There is, however, no need to place each fish separately on the trays. The trays should be wiped with a medicinal grade, colourless mineral oil to prevent sticking of the fish. This oil is cheaper than vegetable oils and does not cook on to the trays.

Smoking-drying times and temperatures cannot be definitely stated as they vary with individual smokehouses. Using the tunnel smokehouse at the Station, one hour at 110° F., was found to be sufficient. Times and temperatures should be arranged to make the fish tough enough for handling during packing. This point is reached when about 8 per cent. of the weight of moisture has been removed in the smokehouse.

Packing in the ¼ lb. oblong sardine can is the most desirable for anchovies, but this can and the machines for closing it are not readily available in British Columbia. The ¼ lb. oval can is used instead with fair results. The best arrangement of the fish in this can is two layers of fish on their sides with heads and tails alternated. This style of pack has a great advantage over the single layer back-down pack in that any belly burning areas are hidden from view. As mentioned before, the drying process must be adjusted so that the fish are not too fragile to pack. Also, to avoid breakage, the packers must pack directly off the smokehouse trays.

Oiling.—The oil used should be a high-grade vegetable oil. Any type, cottonseed, soya, peanut, corn, etc., may be used with good results. However, great care must be taken that the oil is not rancid or off-flavour. Oil sufficient for only one day's run at a time should be supplied to the dispensing equipment, and this equipment should be cleaned daily. Oil should be added hot to improve penetration and assist in exhausting the cans.

Exhaust.—Vacuum-closing machines for ¼ lb. oval cans are unavailable at the present time, so that it is necessary to use an exhaust process before sealing the cans. Satisfactory processes include the use of hot oil alone; hot oil in conjunction with dry heating of the filled cans; or steam exhausting, provided the lids are lightly clinched on beforehand.

Sterilisation.—A suitable retorting process is forty-five minutes at 240° F. (10 lb. gauge pressure).

From *Progress Reports* of the Pacific Coast Stations of the Fisheries Research Board of Canada, No. 77, December, 1948, pp. 108-111.

Meat Research

AMONG the research projects carried on during the 1947-1948 fiscal year by the Agricultural Research Administration of the U.S. Department of Agriculture, was a co-operative study with the office of the Quartermaster-General on factors affecting the keeping quality of mildly cured, sliced, vacuum-packed bacon. It was determined that a moisture-salt ratio of five to one or less would confer good keeping quality on the product for at least three months at 100° F.

A study was made of the fermenting capacity of fifty-one strains of micro-organisms of the genus micrococcus, commonly found in bacon. All but one of these organisms were capable of producing carbon dioxide from carbohydrates, and thirty-six of them produced gas in a cured meat, nitrate, sugar medium. This previously unobserved fact explains the marked tendency of cans of mildly cured, sliced, vacuum-packed bacon to swell during storage.

Experiments were conducted to determine the usefulness of ethylene oxide as a sterilising agent for sliced bacon. Exposing the meat, inoculated with a mixed bacterial suspension, to an atmosphere of 17 per cent. ethylene oxide for three minutes, yielded a product that was sterile after two weeks' storage in cans, but was not sterile immediately after exposure. The lean of bacon so treated, however, was brown rather than pink and had a foreign odour and flavour. When the bacon was treated by adding liquid ethylene oxide, absorbed on a piece of cotton, to the can before sealing, as much as 1 ml. could be used in a 307 × 400 can ($3\frac{7}{16}$ in. in diameter by 4 in. high) without causing objectionable colour or odour changes; but it was insufficient to sterilise the bacon, although it caused a reduction in bacterial count.

Determination of Nicotinic Acid

AMONG the subjects discussed at a recent meeting of the Society of Public Analysts and Other Analytical Chemists was a colorimetric method involving reaction with cyanogen bromide and coupling with procaine for the determination of nicotinic acid in food described by H. G. Rees and P. O. Dennis in their paper on "The Chemical Determination of Nicotinic Acid in Food Products." Rigorous purification of the extracts and compensation for the reagent and extract blanks have been reduced to a minimum and are not necessary for materials rich in nicotinic acid. For cereals, acid hydrolysis, and for meat and yeast products, alkaline hydrolysis were recommended to minimise the colour of the test extracts.

Quick Candying of Fruits

ROLAND JANG and W. V. Cruess have described some experiments the object of which was to hasten the slow process of candying fruits, which consisted of cooking the fruit in a 30° Brix syrup until tender, setting aside for twenty-four to forty-eight hours (*Fruit Products Journal*, **26**, 8, 229). There were twenty-four to forty-eight hour holding periods at room temperature between boilings and a short boiling period at each increase in syrup density. The Brix degree of the syrup was increased progressively to 40°, 50°, 60°, 70°, and 73°. The fruit was stored until translucent in the 73° Brix syrup; it was then drained, dipped momentarily in hot water to remove adhering syrup, drained, and dehydrated to 20 per cent. to 23 per cent. moisture content.

The first quick method was to place the fruit previously cooked in 30° Brix syrup into shallow pans in 40° Brix syrup and concentrate the syrup in a laboratory dehydrater of air blast type at 140° F. to 150° F. to 68° Brix, adding 40° Brix syrup from time to time to maintain sufficient volume. The fruit was allowed to stand one to two days in the syrup and was then drained, rinsed in hot water, drained and dried to the desired moisture content as judged by texture.

Commercial Application

In the second quick method precooked fruit was kept immersed in a syrup maintained at 150° F., and cane sugar and corn syrup were added at intervals of three to four hours to increase the syrup concentration 10° Brix above the preceding initial concentration. The treatment then followed the one carried out in the first quick method described above.

This particular method has been used successfully on a commercial scale in France, British Columbia, and elsewhere.

Vacuum concentration was used in the third method in which the precooked fruit was heated in an excess of 30° Brix syrup under a vacuum of 28 in. The syrup eventually attained 65° Brix at which point the fruit and syrup were removed and allowed to stand one day; the fruit was drained, rinsed, and dried as in the first method.

Vacuumising the Fruit

The last method consisted of vacuumising the fruit in heavy syrup, and this, so far as the authors have ascertained, is more or less new. Fresh fruit was first boiled in 30° Brix syrup until tender. It was then placed in a large flask that would withstand a high vacuum; syrup of 75° to 80° Brix was added to cover the fruit followed by the application of a very high vacuum until no more air bubbles were evolved from the fruit or syrup; vacuum was maintained for a short additional period for good measure. The total period of vacuumising was about one hour. No heat was applied during this period, and equalisation of syrup and fruit was rapid.

After standing one day the syrup was again brought to 75° to 80° Brix by the addition of syrup and the vacuum treatment repeated. The fruit and syrup were then allowed to stand another one to two days, drained, rinsed, and dehydrated as in the first method.

This method proved to be not only rapid but it also produced candied fruits that were translucent and plump.

Pastries and Confections

READING the pages of two recently published books* is like passing from the streamlined, mechanical efficiency of the modern bakery into the copper-panned, oak-beamed interior of the old-time kitchen. The one is a textbook pure and simple, clear cut and scientific in the presentation of its formulae ranging from sponge sandwiches to the more ambitious meringues and chemically aerated foods, and as such is invaluable to the experienced baker and the neophytes of the trade. It combines good illustration and well-indexed information on new appliances, methods, and materials.

While the most sentimental of citizens must accept the irrevocability and the excellence of mass production methods, he will pass on with pleasure to the more esoteric outlook of the second book.

Through the medium of his pages, Mr. Fedden has reaped and safely gathered in for his readers the harvest of his years of travel and experience in the art of intelligent eating with a delicacy and charm that tantalises the would-be epicure and stimulates the senses of the gourmet.

Despite the author's denial that this is a cookery book, many a hostess would welcome its presence in her kitchen to provoke inspiration where it is most needed.

It is pleasant also when an expert such as Mr. Fedden delves into the storehouse of his memories and experiences to show a less fortunate generation the way to complement good food with the appropriate wine, remembering at the same time the economic aspect of this all-important association.

That a generation which has felt the impact of two wars, involving also the vineyards, will not be able to partake of the fruits of a peaceful world is inevitable, but it is to be hoped that with a little guidance such as that proffered by the author, the next generation will at least be more fortunate. —K. V. M.

* *Pastries*. By "Nirvana." 2nd Edition. Pp. 247+ viii. Illustrated. Maclaren and Sons. Price 32s. 6d. net.
Food and other Frailties. By Romilly Fedden. Pp. 142. Seeley, Service and Co. Price 15s. net.

The Hydrogenation of Oils

F. H. SLADE, A.M.I.Mech.E.

Part I

The process of hydrogenation is that of adding hydrogen gas to a natural product or chemical compound in the presence of a catalyst, so when a liquid, vegetable, animal, or marine oil containing unsaturated fatty acid chains is brought into catalytic contact with hydrogen, under controlled pressure and temperature conditions, the hydrogen attaches itself to the double bonds, this chemical change having a decisive influence on some chemical property of the oil, most important of which is the increase in melting point. While this briefly describes the process of hydrogenation of oils and fats, many other factors must be considered when contemplating the installation of necessary plant and equipment, the first of these being that of plant for producing hydrogen of low cost and high purity.

WHILE hydrogen produced by any of the usual commercial methods can be employed, such as by the electrolytic process, the steam-iron process, the catalytic water-gas process, and the hydrogen reforming process using natural gas, coke oven gas, and certain refinery gases etc. for the hardening of fatty oils and acids, not only must the low cost of the hydrogen be taken into consideration, but also the purity of the gas produced.

This must be of the highest standard, any hydrogen containing certain impurities being liable not only to reduce the efficiency of the catalyst, but in some cases to poison it.

The electrolytic and steam-iron processes are widely employed, the former in localities where electrical energy is plentiful and cheap and the latter where the same conditions apply to solid and gaseous fuels.

Electrolytic Method

Hydrogen production by the electrolysis of water is based upon the fundamental principle that when a direct current passes through water, hydrogen is deposited at the negative electrode or cathode and oxygen is discharged at the positive or anode. However, as ordinary water is a poor conductor of electricity, the electrolyte used industrially is a solution of either caustic soda or potash, the concentrations of which are selected to give the maximum conductivity at the particular operational temperature of the battery and hence the lowest possible cell voltages.

Two factors affecting the cell are the potential and oxygen overvoltage of the anode and the potential and hydrogen overvoltage of the cathode, these representing the energy required to discharge oxygen and hydrogen at the positive and negative electrodes respectively.

With steel cathodes and nickel-plated steel anodes, these potentials and overvoltages are as low as possible, and in consequence the electric power required to discharge the gases is at a minimum, while a further advantage of nickel as an anode is that it does not corrode owing to anodic oxidation.

Where the foregoing electrodes and an electrolytic of maximum conductivity are employed, the decomposition voltage is about 1·6 volts, and until this is attained only the smallest amount of current will pass through the battery and no appreciable amount of gas will be evolved.

Referring to the flow diagram shown in Fig. 1, it will be seen that, in operation, alternating current is brought to the alternating current switch gear (A) and converted to direct current by mer-

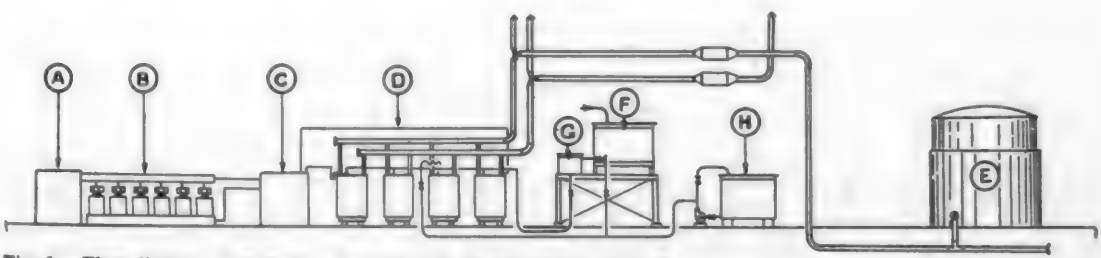


Fig. 1.—Flow diagram of hydrogen production by the chemico-electrolysis process.

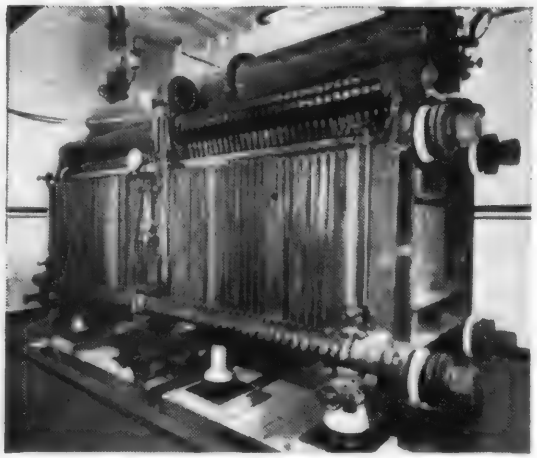


Fig. 2.—Electrolyser for the production of pure hydrogen and by-product oxygen.
Courtesy Bamag, Ltd.

cury arc rectifiers (B) which becomes available at direct current switch gear (C).

Electrolytic cells (D), using direct current, decompose water into its components, the oxygen being discharged to atmosphere and the hydrogen collected in gas holder (E). Distilled water is stored in tank (F) and the solution level is maintained in the cells by means of constant level tank (G). Make-up caustic solution for the electrolyte is stored in (H).

Filter Press Cell

In general there are two types of industrial cells for the production of hydrogen and oxygen, these being the tank type cell and the filter press cell.

The electrolyser shown in Fig. 2 belongs to the latter category. In this type of electrolyser the individual cells, of which there may be as many as one hundred, are clamped together to form a battery through which the current passes from one end to the other, so providing an electrode arrangement that is in series.

The cells consist of frames of steel or plastic material in which are inserted diaphragms of pure asbestos, or diaphragms of pure asbestos interwoven with nickel, for mechanical strength, in the larger types. When steel type frames are employed, the insides of these are covered with insulating composition so they cannot act as electrodes, and create operational faults; the building-up of droppings from the steel cathode and the large magnetic field inside the cell would make it possible to bridge the gap between the cathode and the frame and cause the voltage difference between the frame and the anode to be greater than the decomposition voltage of 1·6 volts, so giving hydrogen in the oxygen.

Between neighbouring cells is a main electrode, separated from the cell frames by insulating joints, which carry two auxiliary perforated plate electrodes, one acting as the cathode in one cell and the other acting as an anode in the neighbouring cell. This arrangement, whereby an electrode acts as positive one side and negative the other side, with both sides at the same potential electrically, is known as the "bipolar" arrangement.

It will be seen from this description that each cell consists of the frame carrying the diaphragm, the anode and cathode with their respective auxiliary electrodes, while the whole battery is held together by tie bars and end plates. The centre chamber in some types serves mainly as a neat plumbing device for the pipework and in others provides additional cooling for the electrolyte, as would be necessary, for example, in tropical countries where the cooling water temperature is high.

When the current is passed through the battery so that the nickel-plated side of the main electrode and the nickel-plated auxiliary electrode are charged positively with respect to the steel side of the neighbouring main electrodes and their steel auxiliary electrodes, oxygen is evolved from the anodes and hydrogen from the cathodes, the two gases

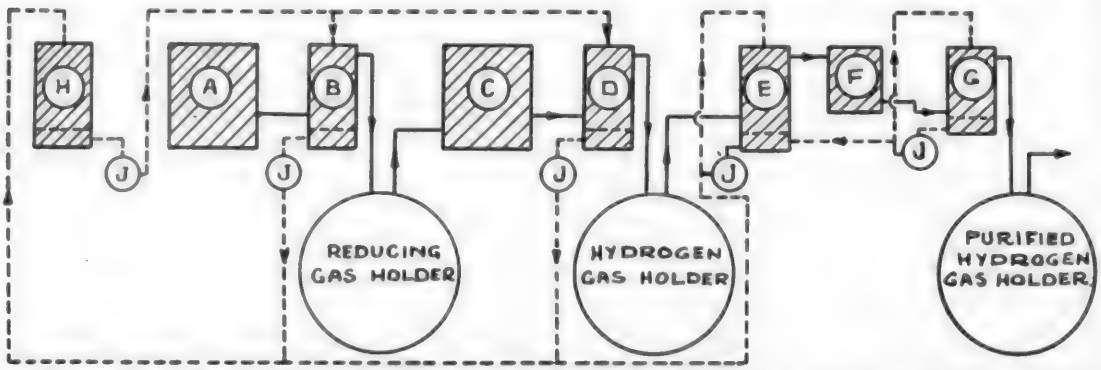


Fig. 3.—Flow sheet of P.G. steam-iron hydrogen plant. A—reducing gas generator. B—reducing gas cooler and purifier. C—hydrogen generator. D—hydrogen cooler and purifier. E—CO_2 primary scrubber. F—CO oxidiser. G—CO_2 final scrubber. H—liquor cooler and regenerator. J—liquor circulating pumps. ——→— gas flow. – – →– – liquor flow.

being kept apart by means of the asbestos diaphragms.

These gases are immediately removed from the path of the current and the overvoltage on the electrode reduced by removing both gas and electrolyte from the cell and replacing by completely degassed electrolyte. Removal is effected by means of the air lift principle, whereby bubbles of gas carry the electrolyte into the respective channels for hydrogen and oxygen, the channels in the smaller types of electrolyser being formed in the cell frames and in the large types made up of external sections insulated from one another, which when drawn together form channels.

Continuous Circulation

The gases and electrolyte then pass to lye drums where the electrolyte, while still containing a certain amount of gas, passes over cooling coils, is completely degassed and its temperature controlled. The gases meanwhile pass through water seals into gas-washing drums where they are scrubbed and cooled before leaving the electrolyser.

The two streams of electrolyte from the oxygen and hydrogen lye drums rejoin at the centre chamber and then pass through a filter to a common lye channel, whence they return through ports at the bottom of the cell. This secures a continuous natural circulation of electrolyte and gas bubbles are continuously removed from the current path, effecting at the same time filtration of asbestos fluff and particles of dirt which might interfere with the efficient operation of the battery.

This continuous circulation also eliminates electrical transference effects which result in the electrolyte on the anode side becoming weaker and that on the cathode side becoming stronger.

As electrolysis proceeds, make-up distilled water is added to the gas-washing drums and is automatically fed from there into the cells, at a rate that is adjustable according to whether the gases are disposed to the atmosphere, the process, or the gas-holder, so ensuring that the electrolyte remains at optimum concentrations.

Operating at a cell current density of up to 2,500 amp./m.^{2} the power consumption is about 4·3-5·0 kW.H. for the production of 1 m.^{3}/H_2 and 0·5 m.^{3}/H_2 or 12·2 to 14·1 kW.H. per 100 ft.^{3} H_2 and 50 ft.^{3} O_2, at an electrical current efficiency of 98 per cent. during constant operation.

Steam-iron Process

The steam-iron process shown by the flow sheet in Fig. 3 produces hydrogen in a single operation, employs an iron base contact material, and requires heat to maintain temperature in the contact material. At the onset the contact material is reduced to iron suboxides with a suitable reducing gas, after which it is in condition to decompose steam to hydrogen, itself being oxidised again,

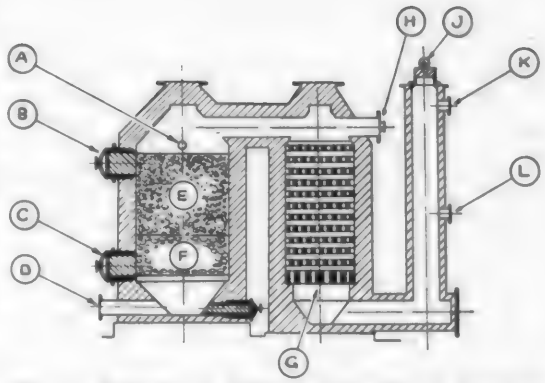


Fig. 4.—Generator for hydrogen production by steam-iron process. A—combustion air. B—charging door. C—cleaning door. D—hydrogen outlet and reducing gas inlet. E—contact material. F—heat exchange. G—superheater. H—purge steam. J—stack valve. K—process steam. L—reheating air.

while continuity of production is attained by repeating the cycle of operation, made up of the contact material reducing phase and oxidising phase with purges as needed.

The contact material consists essentially of oxides of iron, for example Fe_3O_4, which have their oxygen abstracted by the passage of the reducing gases, carbon monoxide and hydrogen, or

$$Fe_3O_4 + CO_2 + H_2 = Fe + 2FeO + CO_2 + H_2O$$

This typical chemical reaction of the reducing phase and the proportions of Fe to FeO varies with the working conditions.

In the oxidising phase, steam is passed through the reduced contact material, to be itself broken down into hydrogen, while the reduced contact material is oxidised back again, more or less in its original form $Fe + 2FeO + 2H_2O = Fe_3O_4 + 2H_2$. Actually, in practice, the whole of the CO and H_2 is not expended to reduce the iron oxides, but some passes through unaffected, for the reaction is a reversible character and equilibrium is dependent on the temperature, etc., so the combustion of this "spent reducing gas" can provide an ample amount of heat to maintain temperature conditions.

Plant Design for Steam-iron Process

Several designs of plant for the steam-iron process have been developed, in which the hydrogen generator is firebrick lined and consists essentially of a section to contain the contact material and a superheater filled with refractory checkerwork.

The construction of one type of plant, for which high efficiency and low operation costs are claimed, is shown in Fig. 4.

It will be seen from this that the reducing gas passes up through the contact material, the spent gas leaving the material is burned with a controlled amount of air, and the hot products of com-

bustion heat up the checkerwork of the superheater before passing to atmosphere at the stack.

During the oxidising stage, which is the hydrogen making period, steam is highly superheated in the refractory checkerwork before passing into the contact material. Other features of generator design include a refractory heat exchanger to retain some of the heat that would otherwise leave the generator with the hydrogen, and a reducing gas preliminary preheater to abstract more heat from the combusted spent reducing gas. The recuperated heat is, of course, returned to the contact materials with the reducing gas to improve process efficiency.

The cycle of operation may be ten minutes, with two phases, of reducing and oxidising, each about five minutes, and the unit employs water-gas made from coke, containing say 40 per cent. CO and 50 per cent. H_2, for reducing the contact materials, although successful operation has been secured with producer gas, town gas, coke oven gas, etc.

Hydrogen Sulphide Removal

Removal of hydrogen sulphide is effected very simply and simultaneously with cooling of the hot crude hydrogen from the generator. Spent solution from the subsequent soda scrubbing towers, wherein CO_2 is removed, is added to the water in the circuit around the hydrogen cooler to maintain a weakly alkaline liquor, and the H_2S content of the hydrogen is reduced practically to the "not measurable" stage. The heated used weak liquor is passed over the liquor cooling tower for cooling by aeration and simultaneous regeneration before re-use, so that as the reducing gas cooler can be served from the same weak liquor circulating system H_2S is substantially removed from that gas simultaneously with cooling it, this step lengthening the life of the contact material in the hydrogen generator.

The cooled hydrogen is delivered through the first of two scrubbing towers for CO_2 removal with caustic soda solution before passing to the catalytic CO oxidiser. Steam is added; the hydrogen, containing from 0·2 per cent. to 0·6 per cent. CO, depending upon conditions of working, is heated and passed through the catalyst material to a gas cooler, and thence through the second soda scrubbing tower to become available as purified hydrogen ready for use. CO_2 is completely eliminated, and with a single stage oxidiser CO is reduced to 0·05 per cent. or thereabouts by reacting with steam to yield additional hydrogen. A second stage oxidiser can readily be applied to reduce the CO content to 0·005 per cent. Any H_2S which may have escaped the first purification, as well as that H_2S which is formed by decomposition of the slight trace of organic sulphur compounds in the catalytic CO oxidiser, is completely removed from the hydrogen in the soda scrubbing towers.

(*To be continued*)

Sugar Refining Problems

SPECIFIC recommendations for the elimination of scale and deposit difficulties during the concentration of the raw juices and the refining of the raw sugar were contained in a paper presented by R. C. Ulmer before the Division of Sugar Chemistry and Technology of the American Chemical Society.

Even the best clarified juices contain materials that become insoluble when the juice is concentrated. In many respects the problem is the same as boiler scale, although only non-toxic materials can be used as treatment. As in the case with boilers, the insolubles usually collect on the heat transfer surfaces, causing marked decrease in efficiency; without proper treatment the evaporators may have to be cleaned twice a week, and once a week is common. The cleaning procedure is costly, from the standpoint of both lost operation and labour, and damage may be done to the metal parts if chemical cleaning is carried out too often. For these reasons a preventive treatment is highly desirable.

In developing the treatment, the experience with previously used materials was considered. The phosphates, ortho and complex, have been used, but have not been very successful, especially in raw sugar plants, undoubtedly because silica scale formation cannot be prevented by these materials. It was found desirable to combine the effects of phosphates, which tend to hold the materials causing deposits in solution, and organics, which tend to maintain in a non-adherent condition materials that do precipitate. The phospho-organics present are very effective in preventing silica and silicates from adhering in the last effects. Thus the shortcomings of a phosphate treatment are overcome and good results are ensured. The materials also are effective in eliminating deposits on pans in refineries.

None of the materials has any adverse effects on the sugar process. They do not settle out, and are contained, for the most part, in the molasses; because of the small amount used, there is no marked effect on the molasses.

BOOKS RECEIVED

Orders for any of the books listed below or reviewed in this issue may be placed with the Books Department, FOOD MANUFACTURE, 17, Stratford Place, London, W.1. It is regretted that under present conditions it is not always possible to supply books by return of post.

How to Form a Private Company. By Stanley Borrie. 22nd Edition. Pp. 65. Jordan and Sons. Price 3s. 6d. net.

A Costing Plan for the Smaller Manufacturer. Pp. 26. Issued under the authority of the Executive Committee of the British Cake and Biscuit Association. Price 7s. 6d. post free.

The flower buds of the clove tree, which are the cloves of commerce, must be picked just before they open. They are shown in the right stage for picking in the photograph on the left. Their colour is then a pinkish apple green. It is only after they have been dried that they assume the familiar deep brown colour. They are then graded (photograph below) and filled into the stencilled bales which the native in the bottom picture is preparing.

Zanzibar Cloves

MORE than 80 per cent. of the world's production of cloves comes from the islands of Zanzibar and Pemba, British East Africa. Although the 1948-49 output is now estimated at 17,500,000 lb. against only about 11,000,000 lb. for the previous season, this is still below the pre-war output which averaged 20,000,000 lb. a year. One cause of the smaller crops is an unidentified disease, known locally as "sudden death," which is reported to have killed a great many trees on Zanzibar island, which normally produces about 20 per cent. of the total crop.

Most of Zanzibar's cloves go to India and the Dutch East Indies for the manufacture of spices and clove cigarettes. The United Kingdom, however, takes most of the exports of clove oil.

Harvesting the Cloves

The clove of commerce is the unopened flower bud of the clove tree. In Zanzibar the tree grows to a height of 30 to 35 feet and is narrow and cylindrical in shape. On Pemba island the trees may grow to 60 or 70 feet. The buds of the clove tree, which grow in bunches all up the sides of the tree, are picked just before they burst into flower. They are then of a beautiful apple green colour, tinged with pink. There are two harvests a year, the first from May to October and the second from December to February. When picked the cloves are dried in the sun, graded and baled. Good quality cloves must retain the "head," be of good size, and of a rich, deep brown colour. To maintain quality standards, government inspectors sample every bale of cloves before it is shipped. (*Manufacturing Chemist*, May, 1949.)

News from the Industry

Plant Products at Olympia

The National Gardens Show is to be held at Olympia from July 24 to August 5. One section of the show will be devoted to plant products and will emphasise man's dependence on plant life for such essentials of his existence as wheat, sugar, vegetables, beverages; cotton, flax, and jute; rubber; and many others.

Research on Pest Control

An account of the work of the laboratory since it started in 1940 and of the background to its formation is given in the first report of the Pest Infestation Laboratory, D.S.I.R. (H.M.S.O., price 6d.).

The laboratory was formed following a request from industry for research to be undertaken on pest control. This request related entirely to pre-war conditions of infestation, although the laboratory was not officially constituted until after the outbreak of war.

The importance of the infestation of stored food was accentuated by the war when large bulks of grain had to be stored for long periods in places which were ideal for insect development. The work involved biological studies of the insects and mites, and physical studies of bulk grain.

One important outcome of this work was the carbon dioxide method for estimating the infestation of a given sample of grain. The laboratory also demonstrated that insects could and did cause grain to heat through the formation of "hot spots."

Work on other control measures included fumigation of grain in silo bins, studies of the penetration of the gas into the foodstuff, and the nature and permanence of residues, in addition to the toxicity of the gas to the many insect species concerned.

A method was developed for pretreating surfaces to be sprayed in buildings in which insect-free foodstuff had to be stored which gave a greatly increased duration of toxicity. Work on fly sprays on behalf of the fighting Services was also undertaken and a new spray-gun was developed, designed to withstand the toughest treatment.

Obituary

Viscount Leverhulme, governor of Lever Bros. and of Unilever Ltd., died on May 27 at Minneapolis, United States, at the age of sixty-one.

Lord Leverhulme was President of the London Chamber of Commerce from 1931 to 1934. Deeply interested in advertising and salesmanship, he was President of the Advertising Association in 1931. He served too as President of the Institution of Chemical Engineers from 1932 to 1934 and of the Society of Chemical Industry from 1936 to 1938.

In 1936 he was instrumental in forming the British Management Council and was a member of the Board of Trade Committee which recommended the formation of the British Institute of Management, which was inaugurated last year.

Lord Leverhulme is succeeded by his only son, Major the Hon. William Philip Bryce Lever, who was born in 1915.

Appointments

Dr. F. R. Tubbs, M.Sc., A.R.C.S., D.I.C., F.L.S., has been appointed as director of East Malling Research Station as from July 1.

Graduating at the Imperial College of Science in 1928, he was subsequently awarded the degree of Master of Science for work on the effect of manurial deficiency upon the mechanical strength of barley straw, carried out under the direction of Dr. F. G. Gregory at Rothamsted.

After spending six months at the East Malling and Long Ashton Research Stations, he proceeded to Ceylon in 1930 to found a Department of Plant Physiology at the Tea Research Institute of Ceylon. In 1935 he was awarded the degree of Doctor of Philosophy by London University for a thesis on the influence of climate and type of pruning on the growth of tea. He also studied methods of vegetative propagation, selection, etc., of the tea bush.

After distinguished war service in the army, Dr. Tubbs returned to Ceylon to resume his investigations at the Tea Research Institute. He came back to England in 1948 to take up an appointment as manager in charge of the Horticultural Division of Lever Bros. and Unilever's Food Research Organisation, Sharnbrook, Bedfordshire.

*

Mr. E. Mitchell Learmonth, M.Sc., F.R.I.C., has been appointed to the board of directors of British Soya Products for whom he has acted as chief chemist for the last three years.

*

Mr. Harold J. G. Watkis, who recently retired from the central purchasing department of Imperial Chemical Industries, has joined one of the associated companies of Reads, Ltd., to supervise the marketing of certain products.

Cloudificator for Soft Drinks

As a result of many years' research into the production of a clouding material which would be adequate under all the difficulties met with in present-day beverages, Polak and Schwarz have produced an agent known as C.L.140 which gives a rich cloudiness having a fourfold protection against coalescing, creaming, or any other form of breakdown. Standing trials of dilutions made from the product have shown great stability, and those which have been standing undisturbed for over six months show no trace of ring formation, and are indistinguishable from freshly made dilutions. Satisfactory results have been obtained from exhaustive tests carried out in a large variety of media including hard and soft waters, strongly acid solutions, spirit up to 60 per cent. U.P., and in the presence of fruit cells and essences. C.L.140 does not, however, eliminate the ring from a product which would develop it in any case owing to the presence of oil droplets or similar bodies, although even here its addition can be beneficial.

Net Weighing Machine

Many products vary in density or bulk when massed and in such cases net weighing offers the only method of accurate weighing. Until recently net weighing with the conventional beam or spring scale methods has not always permitted accuracy to be maintained at high speed, but this drawback has now been overcome with the production of the "Hy-tra-lec" machine manufactured in Great Britain by Industrial Products (Speco).

The weighing principle is that of "positive displacement." Weights are predetermined by adjusting controls on the front of the machine. Material is fed into the vibrator feed leading into the top of the weigher and flows continuously into the receiver bucket which rests on the weighing device in the top centre part of the machine. While this bucket receives material from the vibrator feed, a second bucket discharges its weighed charge into the chute. Each bucket is held firmly as it traverses between "fill" and "dump" positions so that wear is minimised and there is no forcing, jamming, or crowding of the material.

The model "A" machine has been designed to weigh most free-flowing and semi-flowing dry products for packaging in almost all types of containers having a net weight content of from ½ oz. to 2½ oz. Other models for greater weights are also available.

British Food Manufacturing Industries Research Association

The scope and functions of science in the food manufacturing industry were discussed by Professor Sir Frank Engledow, C.M.G., F.R.S., in his presidential address at the third annual general meeting of the British Food Manufacturing Industries Research Association in April.

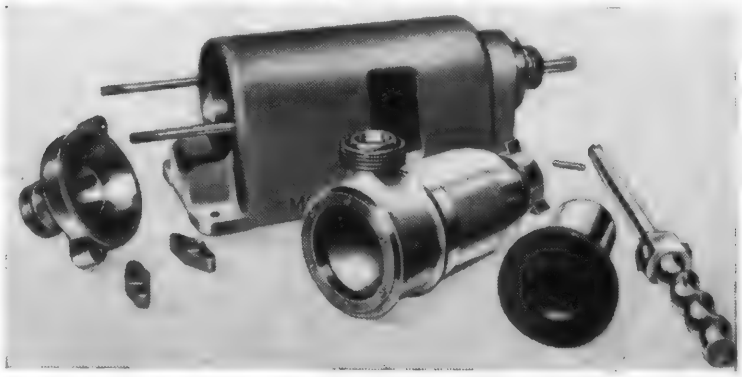
Lieut.-Colonel G. R. Harding, D.S.O., M.B.E., chairman of the Council, presented the annual report, accounts and balance sheet, which were unanimously adopted. He also reported that a start had been made on the construction of the Association's new headquarters at Leatherhead in January last, and that good progress was being made.

Sir Frank Engledow and Mr. J. G. Mathieson (Clarke, Nickolls and Coombs, Ltd.), both due to retire, were unanimously re-elected President and Vice-President, respectively.

Mr. R. S. Worth, C.B.E. (The Nestlé Co., Ltd.), was elected to fill a vacancy on the Council, and the following, due to retire from the Council, were re-elected: *Deputy Chairman*, W. N. Hallett (Cadbury Bros., Ltd), E. G. Alexander (J. and S. Alexander, Ltd.), H. O. Barratt (Barratt and Co., Ltd.), A. E. Burdett (Fuller's, Ltd.), W. B. Chivers (Chivers and Sons, Ltd.), Rex Cooper (George Mason and Co., Ltd.), F. N. Hetherington (Batger and Co., Ltd.), Lieut.-Colonel Sir Cyril V. Jones, C.B.E. (Foster Clark, Ltd.), E. E. Marsh (Marsh and Baxter, Ltd.), and H. Threadgold (Wm. P. Hartley, Ltd.).

During the year under review there were forty-four additions to the membership, and additional supplementary subscriptions continued to be received in respect of the Bakers' Prepared Materials and the Margarine and Compound Fats Group.

A list of members and a survey of the Association's activities are given in the annual report.



Hygienic Pump for Food

Of interest to the food and allied trades is a new range of stainless steel Mono pumps for dealing with edible products, the prototype of which was exhibited at the British Industries Fair.

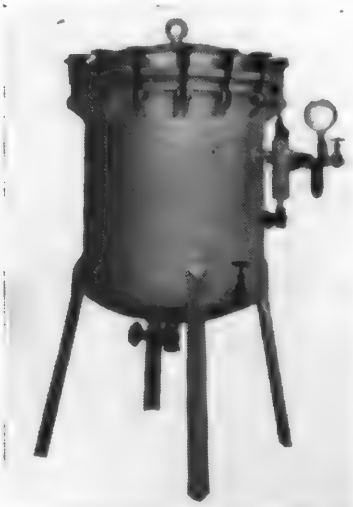
The "Kwikleen" pump incorporates the principle of the normal range of Mono pumps, but is so constructed that the motion of the helical rotor is catered for by the flexing of the stator which is suspended from the flange end. The complete rotating assembly can be easily withdrawn from the pump by releasing one drive pin, while the housing unit and the stator are quickly dismantled by removing two wingnuts. All internal surfaces in contact with the fluid being pumped are polish finished and the stator is made of a special non-contaminating composition.

The suction and delivery parts are fitted with approved quick-release A.P.V. type pipe couplings and plant layout is facilitated by the movement of the delivery branch which is made to swivel through approximately 60° either side of the vertical centre line. The pump is jacketed for heating or cooling.

The pump can handle free-flowing or thick viscous mixtures and maintains steady even pressure without pulsation, emulsification, or aeration.

High-pressure Processing

A simple and cheap method for the extraction of fat and gelatine from fresh bones with a guarantee of sterility, leaving a residue of cooked meat and bone, is provided by a recently patented high-pressure cooker. Known as the "Cookmaster," the cooker can also be used for the processing and sterilisation of all kinds of food including fish and vegetables, for the processing of any material for the production of fat, and for the treatment of condemned meat, fish, or other waste material for animal feeding.



The "Cookmaster" high-pressure cooker.

The vertical type of retort contains a perforated basket supported by brackets in the cylinder. Below the basket is a space which is necessary to ensure the non-spoilage of the gelatinous or other liquid obtained. The steam inlets are so arranged that equal pressure is obtained throughout the processing. Means are provided for separating or collecting any liquid by-products produced during cooking or sterilisation. The steam acts as a buffer between the material and the liquid, the latter being thoroughly sterilised. Residual liquids are drawn off at half time and the steam is released which, by working in reverse direction, acts as a cleanser. Manufactured by Thos. Newman and Sons, the retort is supplied in two sizes with 2-cwt. and 1-cwt. capacities.

Electronic Sterilisation

As a result of Mr. Boothby's remarks in the House of Commons on the matter of a visit of scientists of the Department of Scientific and Industrial Research to investigate the electronic sterilisation of food, the Department has issued the following note:

> The Department of Scientific and Industrial Research is fully aware of the research and development work in progress on the electronic sterilisation of fish and meat and has itself conducted some trials. A research worker has gone to America to assist in assessing the reliability of the reports that have been received. It should be borne in mind that there are two distinct and important aspects of this problem. The first is the effective destruction of the bacteria by the electrons; the second, no less important from the point of view of the ultimate consumer, is the effect of the electrons on the taste and food value of the meat or fish so treated. Both these aspects must be very thoroughly investigated before the claims made for this process can be substantiated.

The Institute of Physics

At the annual general meeting of the Institute of Physics held recently the President, Dr. F. C. Toy, Honorary Treasurer, Mr. E. R. Davies, and Honorary Secretary, Dr. B. P. Dudding, were re-elected for the year beginning October 1, 1949, and the following were elected to fill vacancies which will occur on that date: *Vice-President*—Dr. S. Whitehead; *Ordinary Members of the Board*—Mr. T. C. Keeley and Dr. H. L. Penman.

The report for 1948 of the Institute of Physics shows that its membership increased during the year by 187. It now has seven branches at home and overseas and six subject groups, which held more than a hundred meetings and conferences during the year.

Examinations for the Institute's certificate of laboratory arts and for National Certificates in applied physics (jointly with the Ministry of Education) were held at various centres. In collaboration with the Ministry of Education the Institute held a two-day conference on the teaching of physics in technical colleges. Arising from a proposal made at this event, an Education Group is being formed which will hold regular meetings and symposia. A report on "The Education and Training of Technologists" was widely circulated and many comments sympathetic to the Institute's proposals contained therein were received, especially from industry.

Palletisation to Assist Recovery

At a special demonstration of mechanical handling equipment for pallets, F. M. Montgomery, managing director of Pallets, Ltd., explained how "palletisation" reduced handling costs. This saving, he stated, affected the whole price structure of British economy, and he felt sure that "palletisation" could be one of the biggest factors in the recovery of the country.

Interested Port Authorities and officials of shipping lines inspect the Matling pallet truck.

Mr. Montgomery went on to explain that if the system was to be adopted on a national basis, some developments of the expendable pallet would have to be made. He hinted that his company had in hand several interesting experiments in the use of specially treated cardboard and laminated plastics, and that pallets of this type would cost only a few shillings and could be non-returnable.

A specially designed sling bar for use with all types of pallet, whereby the palletised load can be picked up by crane and dropped into the hold of a ship, figured in the demonstrations given by manufacturers of fork lift trucks and pallet trucks.

Much interest was also created by the Matling 2-ton pallet truck, the three models of which between them covered the whole range of pallet sizes.

Incorporated Plant Engineers

ANNUAL CONFERENCE AT BLACKPOOL

Opening with a reception by the Mayor, the annual conference of the Institution of Incorporated Plant Engineers, held at Blackpool from May 10 to 12, began in earnest with the election of Mr. C. H. S. Howkins, O.B.E., as President in succession to Mr. L. G. Northcroft, O.B.E., M.I.Mech.E., who was then elected first fellow of the Institution. The new President, in his address, outlined the background of the plant engineer by tracing his evolution. The salient features which had affected that evolution were, he said, the world wars which had accelerated mechanisation more than anything else. The plant engineer must possess a wide and varied skill and knowledge of the many branches of engineering with which he comes into contact almost daily. His contribution to management and productivity should be increased primarily by the education of younger men entering plant engineering. In the meantime the knowledge of plant engineering must continue to be increased in all its branches and technique improved.

Following the address the Alexander Duckham Medals were presented, and in the afternoon several discussions on various subjects including lubrication, fuel economy, contractors' plant, and I.C. and C.I. engines were organised.

Proposing the toast of the Institution at the banquet in the evening, Mr. A. P. Young, O.B.E., M.I.E.E., said that the urgent task facing British industry was to improve the quality and lower the costs of its products. The long-range problem was to raise steadily the horse power at the command of the British worker, but to do this it was necessary to extend the area of mass-production by a prior and determined campaign to simplify or standardise designs. Immediate results could be procured by better teamwork, and this meant more human and understanding management at all levels. He felt that the status of the works engineer needed to be raised as had happened in the U.S.A.

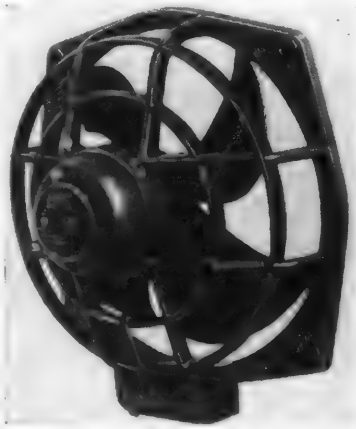
Proposing the toast of "The Technical Press," the general secretary, Mr. H. S. Seaborne, acknowledged the assistance rendered to the Institution by the technical press and among other journals made special reference to FOOD MANUFACTURE and MUCK SHIFTER.

On the last day a discussion on "Management and the Plant Engineer" was held, while some members of the conference visited Burton's biscuit factory. The conference concluded with a meeting on the "Status and Future of the Institution," which was directed to the status of the plant engineer and what the Institution could do to improve that status.

New Propeller Fan

Suitable for A.C. single-phase, A.C. three-phase, or direct current operation, a new 9 in. propeller fan can be used with speed regulators and back-draught shutters. The single-phase type is driven by a newly designed shaded pole-type motor which has a die-cast aluminium rotor.

This model, which is a recent addition to the comprehensive range of G.E.C. propeller fans, embodies an attractive die-cast aluminium mounting, which not only serves as a blade guard but also provides a neat curved grille for the fan aperture. A terminal box is incorporated in the mounting ring and enables the conduit or cable to be connected unobtrusively. Resilient rubber cushions are fitted at the fixing points to absorb any vibration



Sausages from Fish

Considerable interest is being evinced by English firms in a new type fish-sausage which is being manufactured in Scotland. The sausage, which has a 10 per cent. meat fat content, is made with a special type of smoked fish, and is said to taste rather like the pork sausage of pre-war days.

Quick-frozen Whale Meat

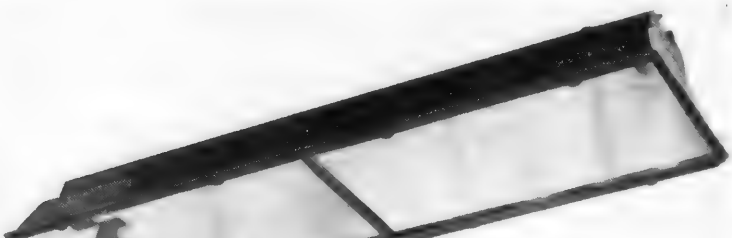
Quick-frozen whale meat, prepared and cut into suitable sizes for easy distribution, made its *début* in Scotland recently with the arrival of the *Southern Raven* carrying 1,600 tons of the meat. Now that more attention has been given to the attractive presentation and thinner slicing of the meat a ready sale is anticipated for all imported whale meat.

Purchasing Officers' Association

The South Wales Branch of the Purchasing Officers' Association recently entertained the National Council of the Association at a dinner held in Cardiff.

Proposing the toast of "The Association," Mr. N. R. R. Brooke said that the importance of an efficient purchasing department in any organisation could not be too strongly emphasised. Buying was no longer a question of obtaining delivery on almost any terms, and he, therefore, particularly welcomed the Association's education and training scheme, which would enable young buyers to be given valuable theoretical training to supplement their practical experience. He said that, above all, the purchasing officer must be a diplomat, willing to co-operate to the very fullest extent with the other branches of management. If buyers generally would refuse to take shoddy goods at high prices, they would have a most important influence on raising the standard of the nation's products.

The President of the Association, Mr. F. O. Ashmore, replied to this toast, and called attention to the rapidly increasing recognition which the Association was now receiving. Guests included the Lord Mayor of Cardiff (Alderman R. G. Robinson, J.P.), and Sir Frederick J. Alban, C.B.E., J.P., chairman of the Welsh Regional Hospital Board.



Visor covers protect the reflectors from the direct deposit of dirt and dust.

Reflector Covers

Supplied with clear glass or with acrylic plastic panels, and fitted with a rubber gasket secured to the frame so as to ensure a close fit, visor covers have recently been produced by Benjamin Electric for the protection of their Flurolier reflectors from the direct deposit of dirt and dust. The covers, the metalwork of which is bonderised and sprayed to match the reflector, are made up in special rolled section steel frames, divided into two panels by a central bar. Along one side of the frame is fitted a hinged metal strip equipped with a patented device for easily and quickly securing the cover to the side of the reflector, no holes being required in the reflector for attaching the visor. Easy access to the reflector interior is thus provided, the free edge being fastened by several hinged clips to the reflector bead.

British Agents for Can-making Equipment

The Lima-Hamilton Corporation of Hamilton, Ohio, manufacturers of high-speed can-making machinery, have appointed Reads as their sales agents for the British Isles, most of Western Europe, Egypt, and North Africa.

The Corporation manufacture a full range of high-speed can-making equipment, including automatic high-speed bodymakers, incorporating flexers and with soldering and beading attachments if required, together with flangers, flanger beaders and double seamers for square, irregular, and round cans. Other equipment at present being manufactured by them includes high-speed strip feed presses and single and double gang slitters.

Industrial Seating

Proper seating for the individual worker is an important factor in industry and a new chair produced by Fisher and Ludlow has been designed to give operatives maximum comfort. The resin-bonded plywood shaped seat is continually rotatable in any direction and a foot rest rises, falls, and swivels with the seat. A strong but flexible support holds the operative's back in correct position while the height of the "Flowchair" is adjustable between 1 ft. 6 in. and 2 ft. 3 in. by means of a simple locking device.

Fluorescent Light Aids Sales

How fluorescent lighting can promote sales by improving appearance is illustrated by the display lighting which is a standard feature of the "Hallmark" frozen food display and storage cabinet. Manufactured by J. and E. Hall, these cabinets are equipped with a single Philips 80 W. fluorescent lamp to light the display panel and contents; apparatus and starter are mounted alongside the compressor unit.

"Hallmark" frozen food cabinet illuminated with a Philips fluorescent lamp.

Gelatine and Glue Research Association

Mr. A. G. Ward, M.A., F.Inst.P., has been appointed director of the newly formed British Gelatine and Glue Research Association. The scope and need for fundamental research and for the development of new and extended uses for the products of the gelatine and glue industry led to the decision made in 1947 to form a research association. Preliminary work was done by the Federation of Gelatine and Glue Manufacturers and already more than half of the member firms have joined.

The Research Association will work along the normal co-operative lines and will be assisted by a grant from the Department of Scientific and Industrial Research. Work will be carried out in two main fields, (1) fundamental research on raw materials and problems affecting the industry, and (2) research with immediate practical application, including the possibility of new uses.

It is hoped that the laboratories of the Research Association will be set up in London.

Meat Products Export Trade Revived

Nearly fifty years ago, Thomas Wall, pioneer of the British breakfast sausage, began to consider the possibilities of the export market, looking in the first instance towards Paris as a potential market for his sausages, galantines, and other specialities. When the war broke out, T. Wall and Sons were exporting meat products on a large scale and British sausages, steak and kidney pudding, beef with dumplings, tongues, and other lines were known throughout the Empire.

The Ministry of Food recently invited Wall's, among others, to revive their export trade on condition that four-fifths of it was with countries who pay in dollars. Economically, the revived export trade is merely a shadow of its former self and future prospects are obscure, yet, by changing from one line to another according to orders received, the kitchens are kept busier than at any time since 1939. The firm keep in touch with 250 agents in different countries and are always seeking opportunities to develop new lines.

Transfer of Administration

As better manufacturing facilities are now available at Stanningley, where the parent concern, George Cohen Sons and Co., have their works, Metalclad are to concentrate both administration and production there. The transfer will be gradual over the next few months and neither output nor service will be affected.

The company's newly equipped foundry at Beaufort Works, Morriston, has now commenced production. As output increases, this will provide all the iron castings required by Metalclad, and the foundry will also have sufficient capacity to undertake outside work.

A Toast to the Electric Vehicle

Proposing "The Electric Vehicle" at the annual luncheon of the Electric Vehicle Association on May 18, the President, Mr. A. W. Barham, in the chair, Sir Cyril Hurcomb, G.C.B., K.B.E., chairman of the British Transport Commission, spoke of the progress made during the last ten years and of the proved usefulness of the battery electric vehicle.

In reply, Mr. Peter Rochs, chairman of the Association, said that the important part played by the electric vehicle in the national economy must continue to be stressed to Government officials. More help was also needed from the British Electricity Authority to establish a standard price per unit for battery charging and for adequate periods during which off-peak rates would be available to electric vehicle users.

In his concluding remarks, Mr. Rochs expressed the hope that the time was not far distant when the sphere of usefulness of the electric vehicle would be extended to cover the delivery of coal, and the carrying of goods and parcels for British Railways, and that in progressively increasing measure the electric vehicle would be used for the carrying of mail.

Dulcin Now Available

One result of the cancellation of the Saccharin Order, 1944, and the issuing of the Saccharin Order, 1949, will be to make supplies of "Dulcin" (*p*-phenetylcarbamide) available without permits.

Mobile Refrigeration

A Press preview of the Prestcold refrigeration mobile exhibition vehicles was arranged by the company on May 18 at Kidlington, the site of the Oxford Agricultural Show. Guests assembled at the Pressed Steel Co.'s factory, Cowley, Oxford, for lunch, after which they departed for Kidlington, where they inspected the admirably fitted exhibition stands, displaying the full range of Prestcold refrigeration, but designed for complete mobility.

When open, they are luxurious showrooms with the van sides folded up to form a roof, down to form a floor, and many novel fittings in place. Closed, they are streamlined goliaths of the road with their own specially designed automobile power units to take them to agricultural showgrounds, market places, and village greens in many parts of the country.

Much ingenuity has been exercised, many unusual points of design incorporated, and a wealth of skill and experience in automobile body-building drawn upon by the company's personnel, who have been entirely responsible for their production.

To all agricultural users of refrigeration, whether the farmer in his dairy or the farmer's wife in her larder, and to many others concerned with food storage, the mobile exhibitions, which will appear at Agricultural Shows throughout England, Scotland, and Wales during 1949, will be of inestimable benefit. These people, often located in remote rural areas, will have a first-class refrigeration display on their doorstep.

Battery Guarantee Increased

A proportional guarantee of four years, instead of three years, to cover all "Young" traction batteries for electric vehicles and industrial trucks despatched on or after March 1, 1949, has been announced by Crompton Parkinson. This increase in the guarantee period is the outcome of developments resulting from research in the New Malden laboratories, improved methods and equipment, with scientific quality control in the works, and prolonged investigations of batteries in service.

Temperature Recorders

Rustproof, weatherproof, and impervious to vibration, the "Hylotherm" accurately records maximum and minimum temperatures over any period, thus preventing irreparable losses due to unsuspected variations in temperature. Accurate balancing and positive locking of the pointers ensure reliability, while a press button makes resetting simple and instantaneous. The recorder, made by Smiths English Clocks, is available with gimbal bracket for wall fixing; desk models are also produced and can be supplied with combined barometer and thermometer dial.

Changes of Address

The offices of the Coal Tar Research Association were moved on May 30 to the new research station. All letters should be addressed to the Association at Oxford Road, Gomersal, nr. Leeds. Temporary telephone number: Cleckheaton 851.

*

The Livestock Export Group is now situated at 94, Jermyn Street, London, S.W. 1. Telephone number: Whitehall 6071.

*

The new address of the Spooner Food Machinery Engineering Co. is Ilkley Hall, Ilkley. The telephone number (Ilkley 911) remains unchanged.

*

The offices of the Scientific Instrument Manufacturers' Association have now been transferred to 17, Prince's Gate, Kensington, London, S.W. 7. (Telephone: Kensington 0061-2.)

S.C.I. Agriculture and Food Groups

REVIEW OF A SUCCESSFUL YEAR

In the Honorary Secretary's report for 1949-1950 he states that since the last report was written the Agriculture Group can claim to have had a successful year, probably the most successful one since its inception in the difficult years of the recent war. The membership both at home and abroad has increased and now stands at 300 in the British Isles with a further score or more overseas.

During the Session 1948-1949 a larger programme of meetings was arranged than in previous years. At the great majority of these meetings a good number of enthusiastic members and visitors attended, not only to listen, but also to contribute materially to the discussions.

It is not always realised that agricultural chemistry covers an enormous field of knowledge, much of which is very imperfectly understood. The nature of the scope may be gathered by the subjects for the lectures given before the Group during 1948-1949:

Chemical Control of Protozoan Parasites.
Soil Survey and Soil Classification.
The Chemistry of Plant Growth Regulators.
World Cereals Today.
Granulation of Compound Fertilisers.
Moorland Pastures and Animal Nutrition.
Soil Microbiology, Antibiotics, and Plant Diseases.
The Evaluation of Selective Weedkillers.
Fertiliser Placement.
The Chemistry of Ensilage.
The Scientific Basis of Cheesemaking.

More collaboration with other Groups and Sections was undertaken during the year under review, joint meetings being held with the Food, Fine Chemicals, and Chemical Engineering Groups and with the London, Newcastle, and Nottingham Sections. A joint meeting with the Biological Methods Group of the Society of Public Analysts was one of the most successful of the year.

For its 1948 summer outing, the Group visited the East Malling Research Station in May. This annual country meeting at a place of interest to agricultural and horticultural chemists, and to other scientists, has now become an established outing. This year's outing took place in June, when members visited Cheshunt Experimental and Research Station, by kind permission of Dr. W. F. Bewley, C.B.E.

In addition to these activities, the Group has been responsible for producing that section of the Annual Reports on Applied Chemistry which deals with agriculture and horticulture. Under the editorship of the chairman, Mr. A. G. Pollard, nine contributors reviewed various aspects of agricultural and horticultural chemistry. This procedure was successful and is to be continued next year, when up to 50 per cent. more space will be available for the report.

By now every member of the Group should have received literature giving details of the Second International Congress of Crop Protection which is being held at the Imperial College in South Kensington, London, from July 21 to 28, 1949. During the year the Group was represented by the chairman and honorary secretary on the Executive Committee of this Congress.

Food Group

Twelve scientific meetings covering a wide variety of subjects connected with food technology are among the numerous activities recorded in the annual report of the Honorary Secretary of the S.C.I. Food Group for 1948-49. The Group makes a special point of collaborating with the various sections; twice as many joint meetings were held this year as in previous years.

Careful consideration has been given to the future publication of Food Group Proceedings and it has been decided that publication should be discontinued.

The report recalls the success of the Food Group summer tour in Eire and two other outstanding events—the conversazione at the United Dairies Central Laboratories and the annual dinner-dance held in February.

In addition to the summer tour to Bordeaux, the new session's activities are to include a two-day conference on "Amino Acids and Protein Hydrolysates" in September, a conversazione in November, and the annual dinner-dance in February, 1950.

Nutrition Panel

That the vigour of the Nutrition Panel was well maintained during the year 1948-49 was proved by the annual report of the Nutrition Panel Committee of the Society of Chemical Industry. In all, seven scientific meetings were arranged, the first of which was a highly successful meeting held jointly with the Microbiological Panel at which Dr. E. F. Gale discussed the function of vitamins and metals as coenzymes in bacterial metabolism. The meeting on "Genetic Factors influencing the Nutritive Value of Animal and Vegetable Foods" was postponed, but will be in the next session's programme.

During the year a new series of meetings entitled "The Nation's Manufactured Foods" was inaugurated. The first meeting on "The Sausage as Food," which was held in January, took the form of a symposium in which the history of sausages, the chemistry of different varieties, and their nutritional contribution in the diet were discussed.

On the initiative of the Panel Committee and in conjunction with the Committee of the Biological Methods Group of the Society of Public Analysts, a survey was made of the fiducial limits acceptable to bioassayists in the assay of vitamin D by means of rats. The results of this study together with suggestions as to the limits of accuracy that would be considered commercially acceptable constitute the first authoritative statement on this matter.

Arrangements for five meetings for the 1949-50 session have already been made; two of these will be further symposia in "The Nation's Manufactured Foods" series, while the other meetings cover (1) the nutritional significance of vegetarianism, (2) an up-to-date review of vitamins, (3) the influence of genetic factors on nutritional values of animal products and crops.

BOOKLETS RECEIVED

A new and comprehensive price list of aromatic chemicals has recently been produced by the chemical department of Polak and Schwarz.

■

Their six most popular models of filling and weighing machines are described in a new folder issued by Valley Products (Lye). These machines include a bottle filler, a piston type pre-measuring paste and cream filling machine, a rotary type volume filler and a hydraulic density type filler, as well as an all-electric automatic weighing and filling machine, and a screw type loose filler for powders and granulated materials.

■

Incorporating many features which contribute to improved performance and convenience, some new dairy sterilising chests of the storage block type and directly-heated type are described in a recent G.E.C. publication. A "Minor" model electric sterilising chest for the smallholder and small ice cream producer, steaming units, electric steam raiser, floating electrode steam raiser, and electric storage water heaters are also described.

■

Comprehensive information on the first V-belt drives to be designed in this country specially for fractional horse power service is contained in a new catalogue issued by J. H. Fenner and Co. The new drive covers a range of lightweight pressed steel pulleys plus single cord fractional horse power V-belts and is for use wherever a low powered drive is required, as for refrigerators, washing machines, and light machine tools.

■

In their first complete catalogue since 1941, W. J. Bush and Co. have given not only prices of their essential oils and fine chemicals but also comprehensive information on their use. The list is divided into eight main sections covering food and confectionery, beverages and ice cream, essential oils, fruit juices and concentrates, etc., and these sections are in turn divided into sub-sections. Produced in book form, the catalogue is thumb indexed for rapid reference.

OBITER DICTA

● Of course there is a rush for sweets; the people are hungry. —*Correspondent to the "Evening Standard."*

● I have received messages from Africa that it is not the scheme but the Minister that is nuts.—*Sir Waldron Smithers, M.P.*

● We consider the use of goat flesh in sausages favourably; it is as good as beef.—*Ministry of Food official.*

● Time will show whether the new State public houses are to be a home from home or a home office from Home Office.—*The Marquess of Reading.*

● The "pop weasel"—a quick-money boy who sells halfpenny flavoured water drinks for sixpence—is after your money.—*The Association of Soft Drinks Manufacturers.*

● Sherry, pet cat of the Bishop of Colchester, has been renamed Shandy. "One of my clergy suggested Sherry was a little too strong," the Bishop explained. —"*People.*"

● If we have no dollars we can have no coffee; no dollars, no tobacco; no dollars, no Betty Grable. This is the reason why Canadian salmon are now living to a ripe old age.—*Mr. S. N. Evans, M.P.*

● Some people seem to regard cocktails as a necessary corollary to any gatherings at their homes, at dances, or hotels.—*Mr. F. T. Eason, chairman of the executive committee of the Irish Association for the Prevention of Intemperance.*

● If someone could invent a way of obviating the job of cleaning the porridge pot, it would go a long way towards increasing sales of oatmeal.—*Mr. A. Douglas, chairman of the Scottish Oatmeal Millers' Association.*

● We are told now that this blackish or off-colour bread is healthful for us, but we were never told that before the war, and I don't believe it, and personally don't like it, and I don't think people in the towns like this dark-coloured bread.—*Mr. R. J. Charlton, chairman of the N.F.U. Pigs Committee.*

COMPANY NEWS

After payment of the dividends on the preference and preferred ordinary shares of the Maypole Dairy Co., and allocating £10,000 to reserve, the directors recommended that a dividend of 3 per cent., less income tax, be paid on the deferred ordinary shares.

■

At the forty-third annual general meeting of the Meadow Dairy Co. held recently the payment of a dividend of 10 per cent., less income tax, on the preferred ordinary and ordinary shares was recommended by the directors.

■

In his report for the year ended December 31, 1948, the chairman of the United Glass Bottle Manufacturers, Mr. Harold St. J. Judd, said that during the year under review a record turnover was achieved which, coupled with the introduction of improved mechanical devices and production methods, had made it possible to maintain profits without passing on a price increase to customers. The policy of moderation with regard to dividend distribution to which the company had subscribed was reflected in the recommendation of a final dividend on the ordinary stock of 10 per cent., making a total distribution of 15 per cent. for the year.

■

The successful surmounting of difficulties resulting from the termination of the concentration scheme of the soft drinks industry was shown by the results of the year's working, it was stated by Mr. Lauchlan Rose, chairman of L. Rose and Co., when he spoke at the annual general meeting of the company recently. The demand for their principal products remained gratifying but owing to the continued restriction in supplies of sugar it could not be satisfied in full.

Exports during 1948 were more than double those of the previous year while the importation department of the company achieved a record figure.

An interim dividend of 6d. per share, less income tax, had been paid on the ordinary shares, and a final dividend on these shares of 1s. each, making 1s. 6d. per share for the year ended December 31, 1948, was recommended.

News from Overseas

Mechanical Engineering Congress

The second International Mechanical Engineering Congress, organised by the Engineering Trade Associations of the principal industrial nations in Western Europe, to be held in Paris from September 12 to 17, 1949, will have as its theme "Production Efficiency." In addition to the presentation of papers, visits to factories in Paris and district have been arranged.

This Congress affords yet another opportunity for engineers of the United Kingdom to make contact with their counterparts in other countries.

Food Production in N. Ireland

The provisional figures of production now available show that the year 1948-49 has been one of considerable achievement for Northern Ireland, who are definitely reaching their targets and, in some cases, improving on them.

Production of milk continues to increase, and it is estimated that the 1952-53 target may be achieved this year—three years ahead of programme.

Egg production in 1948-49 is estimated at 74 million dozen compared with 43 million dozen ten years ago. There is every indication of still further expansion in the present year having regard to the slightly better supplies of imported feedingstuffs. There is a reasonable possibility that the target of 80 million dozen set for Northern Ireland egg production to be reached in 1952-53 may be reached in 1949-50.

The meat position is improving fairly rapidly so far as it relates to pig meat and mutton and lamb. The improvement in beef, however, while encouraging, is not so rapid.

Production of mutton and lamb in 1948-49 was 95,000 cwt., which compares with only 75,000 cwt. in the previous years. If this trend continues the target set for mutton and lamb for 1952-53 may, in fact, be reached in 1949-50.

Shipments to Great Britain in 1948-49, after retaining sufficient to meet the ration entitlement as part of the United Kingdom, show a substantial increase compared with 1947-48.

Milk shipments, either liquid or in processed form, were 18,600,000 gal. compared with 14,800,000 gal. Egg shipments were 32 million dozen, representing 43 per cent. of the entire production, compared with 26 million dozen in 1947-48. Bacon, ham, poultry, and meat all showed increases.

In addition to these shipments of livestock products, large quantities of ware potatoes have been sent to Great Britain, and certified seed potato shipments, mainly to Great Britain, are this season about 161,000 tons. This compares with only about 18,000 tons prior to 1939. Shipments of canned and quick frozen food amounted to about 500,000 cwt. compared with virtually nothing in 1938-39.

Crabs in Cardboard

A pack for crab products recently put on the market by the Blue Channel Corporation of Beaufort, South Carolina, consists of a cardboard container which has a large transparent square in the centre of it and a smaller, rectangular transparent inset just below. Through the lower inset can be seen the two tins of vacuum-packed devilled crabs, while the upper square shows eight sanitary crab shells, ideal for use in serving and displaying the product.

Australia's Tinplate Shortage

The export from Australia of canned food products is being seriously affected by the lack of tinplate. The shortage may cost Victorian farmers thousands of pounds and upset Australia's food exporting plans. The sale of produce to canneries is the main activity of many farmers, and if they are deprived of a part of their market they may change over to farming of a different kind.

Synthetic Rice

Experiments in the manufacture of synthetic cereals are now being conducted at a factory in Coimbatore, South India, where Indian food experts are trying to produce synthetic rice—food grains made from a mixture of tapioca or sweet potato flour, with groundnut cake flour and wheat.

Large-scale production of synthetic cereals which will contain carbohydrates and protein in the proportion in which they are contained in cereals is to start at the end of the year. Besides groundnut, tubers of all varieties will be used for the purpose.

Pullorum Disease Control

A stained-antigen, whole-blood test for pullorum disease in chickens, developed by the research staff of the U.S. Bureau of Animal Industry, enables poultrymen to suppress this serious malady at a rapid rate and small expense.

To make the test, a drop of stained antigen is placed on a glass plate. The staining reagent is a violet dye, which makes reactions clearly visible. A sample of blood is then taken from the chicken to be tested and added to the antigen on the plate. The antigen and blood are next stirred together and further mixed by slight tilting of the plate and a gentle rocking motion. A clumping, or agglutination, of the mixture signifies that the bird carries the infection of pullorum disease and should not be used for breeding. A mixture free of clumping is a sign that the bird is not infected. The test usually can be made in about a minute.

Doves of Dough

Leading Italian pastry manufacturers recently revived a tradition which had lapsed during the war—that of serving sweet dough made in the shape of a dove during Easter. The dough, which is composed of wheat flour, sugar, fresh butter, egg yolks, almonds, candied citrons, and oranges, is fermented by a lengthy natural process and baked for thirty minutes in a continuous oven at a temperature of 400° F. to 430° F.

Floating Oil Refinery

A 7,000 ton landing-craft has been towed from Newcastle to Norway, where it is to be converted into a floating factory for the extraction of oil from herrings. The vessel will be able to operate not only off the Norwegian coast but in distant waters, on fishing grounds rich in fish but hitherto poorly exploited. Among the many difficulties to be overcome when the vessel is far from shore will be how to load the herrings from the fishing boats into the factory ship in stormy weather. Transfer of the fish by grabs will be difficult, if not impossible, and the practicability of using suction pipes is being considered. Another problem will be the availability of fresh water. Either a large condensing plant will be needed or a new manufacturing process will have to be devised.

World Conservation Conference

At the suggestion of the United States Government, the United Nations is arranging for a scientific conference on conservation and utilisation of resources, to be held from August 17 to September 6 in the United States. The intent of the conference is to give scientists and administrators from all parts of the world an opportunity to exchange knowledge on new developments and techniques in resource management and to analyse their costs and benefits.

The proposed conference is an important step in President Truman's Point Four Programme for the development of the underdeveloped areas of the world to maintain and improve the levels of living of their peoples; but its interest will not be confined to these areas. The industrial countries will also benefit by exchange of ideas that will improve the development and utilisation of their resources. The United States itself has much to learn as well as to impart in such a conference.

Basic to the solution of most resource problems, both for developed and underdeveloped areas, are abundant supplies of energy. The World Conservation Conference is, therefore, giving considerable attention to energy supply problems.

In addition, experts will discuss the latest and best experience with respect to problems of soils, crops, forests, and livestock, to mineral development and utilisation, to fish and wild life conservation, and to water control and utilisation.

No country, not even one endowed with natural riches and a highly developed economy, can, in the long run, keep its standard of living or raise it without continuous attention to the conservation and replenishment of its resources. The basic techniques for doing many of the things that need to be done are known. To put them to practical use requires the closest co-operation between scientists and engineers, between governments and industries, and between nations. This requires a world-wide realisation of the importance of conserving and intelligently using the earth's resources, and focuses world attention on co-operative means of increasing the productivity of the earth.

Packaging Research in America

PAST WORK AND FUTURE PLANS

An incorporated technical association of more than 300 firms engaged in various aspects of packaging, the Packaging Institute, Inc., of New York, is the common meeting-ground for consideration of the technical problems of packaging. Other activities are performed through its many committees and sub-committees who, at the moment, are discussing the adoption of a set of standardised testing procedures for recommendation to members for use in testing packaging materials and completed packages from the viewpoint of the needs of the package user.

Another sub-committee is engaged on the development of a directory of machinery used in packaging; this will provide a useful complement to the recently published *Glossary of Packaging Terms*.

The work of the technical committee is growing, and future projects include the setting up of a sub-committee on testing glass containers.

One of the most important activities of the Institute is its advisory service, which supplies needed data and by which members are enabled to learn other members' suggestions as to how to solve difficult packaging problems.

A monthly periodical is published covering all the technical packaging news and literature, including patents throughout the world, and each autumn a convention is held.

Present officers of the Institute are:

President: Charles L. Barr.
Vice-Presidents: Charles O. Kendall and Henry W. Stevens.
Executive Director: Laurence V. Burton.

Dr. L. V. Burton.

Dr. L. V. Burton is completing his first full year as executive director and has been responsible for the development of the various committees who have carried out important work on investigating a diversity of packaging problems.

After an early life crowded with experience, including service in World War I, Dr. Burton, from 1928-1947, was assistant editor, associate editor, and editor of *Food Industries*. During World War II he was war correspondent on the food front in Australia, New Zealand, New Caledonia, and New Guinea. In 1945 he visited Great Britain for the U.S. Army on a special mission.

Dr. Burton's hobby is painting in oils, and he has just published a book, *Week-End Painter*.

Expansion of Fruit Canning Plant

To meet the increasing demands expected to be made on the South African canning industry by anticipated expansion in the growing of pineapple in the next five years, Standard Canners of Port Elizabeth are expanding their plant and will produce a wide range of products from various canned fruits to fruit juices, jams, and cordials.

Besides modernising its present plant, the company has installed new equipment and intends to continue with its policy of mechanisation.

Ireland Removes many Export Controls

The following goods may now be exported from Ireland without licence: Cakes, cake mixtures and puddings for human consumption, coffee berries, cornflour, custard powder, almonds, dried fruit, oranges, lemons, grapefruit, apples, currants, gooseberries, grapes, plums, raspberries, strawberries, with the pulp and squash or crush, honey, jams, marmalades and fruit jellies, candied peels, pickles, spices, sauces and condiments, sardines, sugar confectionery, excluding cocoa preparations, anchovies and pilchards, gelatine, starch, and preparations thereof.

Rice Programme for Philippines

Designed to make the Philippines not only rice-sufficient but able to offer surplus quantities for export, a ten-year rice production programme, calling for an outlay of 150 million dollars, is to be put into operation.

The programme envisages not only the full development of the three government rice projects in the Ala Valley, Mallig, and Mindoro, but the eventual cultivation of various previously surveyed rice areas, so that, after the tenth year, the government will have placed over half a million hectares of land under rice cultivation.

The outlay needed for this long-range programme will be utilised for essential equipment, seeds, fertilisers, the construction of irrigation aids, and for salaries of personnel. After the third year the programme will be self-supporting, and price reductions should be felt appreciably in the fourth year of the scheme.

All the facilities of mechanised farming will be utilised; even sowing by aeroplane will be tried, and, if found practicable, will be fully exploited.

Flour Restrictions in Ireland

The Irish Government restricted the use of flour of 85 per cent. extraction from May 21, from which date such flour might continue to be used for domestic purposes or for the manufacture of bread sold in units of one pound or multiples of one pound in weight, but might not be used for any other purposes save under permit granted by the Minister for Agriculture.

The use of such flour in the manufacture of flour confectionery is not to be permitted.

FAO Fisheries Councils

A call for quick results in the war against starvation by utilising the resources of the sea was made by FAO Director-General N. E. Dodd in opening the first meeting of the Indo-Pacific Fisheries Council at Singapore recently. The Council is the first of a series of regional fisheries councils which FAO will initiate to encourage governments to co-operate in developing the production and more effective use of fisheries products in order to improve nutritional levels for the peoples of each area. Among other functions the Council will disseminate technical information, will recommend and co-ordinate research and development projects, assist member countries to obtain essential materials and equipment, and report annually to the FAO conference.

British Equipment in Ireland

ROYAL DUBLIN SPRING SHOW INDUSTRIES FAIR

A wide range of milk and ice cream processing equipment was shown by the Creamery Package Manufacturing Co. at the Royal Dublin Spring Show Industries Fair held during the first week in May. Included in the exhibits were a continuous freezer, which can be refrigerated by ammonia, methyl chloride, or freon, the Multi-Flo homogeniser, which incorporates the C.P. single service valve, thus enabling the machine to operate at a considerably lower pressure than was possible in the past, and the Full-Flo plate heat exchanger, which is a complete H.T.S.T. milk pasteuriser. Although not on display, the new Multi-Pass plate heat exchanger and cooler for low capacities which can be modified for the ice cream cooling process was the subject of many enquiries.

The Multi-Pass plate heat exchanger and cooler.

In the Industries Section, the Irish Glass Bottle Co. had an experimental exhibit of vegetables and other food products packed in jars. An interesting development to be seen on the stand of Henry Denny and Sons was a breakfast fry, consisting of a beef product with a bacon flavour.

Quick frozen foods were represented by Ever Fresh Foods, who have increased their range of packs, which now include sixteen varieties. The products displayed included melon, rhubarb, mushrooms, and spinach. Turkey, chicken, and salmon cutlets are now being packed, and plans are in preparation for freezing corn-on-the-cob and oysters.

English-Italian Technical Dictionary

A new 470-page English-Italian and Italian-English technical dictionary by P. Guazzo has recently been published by G. B. Petrini, of Turin. Excellently produced, it is entirely devoted to technical terms, and will be useful to English and Italian chemists, physicists, engineers, and business men who have occasion to use each other's language, whether for reference to the literature or in the preparation of catalogues, etc.

The printing of the words is in large bold type, rendering quick reference particularly easy. The price is 850 lire.

Cheese from Sheep's Milk

As a result of experiments carried out by an Italian cheese specialist on "pecorino," a hard, pungent cheese made from the milk of the Mediterranean race of sheep, various types of cheese ranging from soft, creamy varieties to solid *provolone* have been produced. None of these possesses the smell and pungency typical of sheep cheeses.

At an experimental plant in Pietra the milk is first filtered under pressure and then warmed up before rennet is added. Renneted milk is transferred to a special room where the actual cheese making takes place and where a constant temperature of 85° F. is maintained. The resulting serum is put into metallic parallelepiped boxes with holes for drainage. From these the product goes into a maturing chamber where it is kept at a temperature of approximately 40° F. for a period ranging from thirty to forty days.

At present the production is in the experimental stage, the output being limited to about 300 kilograms daily and all is consumed in Rome. Studies towards evolving other types of cheese are being continued.

Preserved Food Exhibition

The Fourth International Preserved Food Exhibition will be held at Parma, Italy, from September 8 to 19, 1949. The following comprise exhibits:

Preserved Fruits and Vegetables: Tomato concentrates, marmalades, jams, candied fruits, pickles, dehydrated green and other vegetables, fruit jellies, etc.

Preserved Meat Products: Salted provisions, uncooked, cooked and smoked hams, sausages of any kind, canned meat, preserved fish, etc.

Fruit Juices and Syrups: Juices and syrups of any fruit, concentrated musts, etc.

Milk Products: Condensed and powdered milk, canned butter, etc.

Cubes and Extracts for Soup: Meat, vegetable, and mixed bouillon cubes and extracts.

Packaging Equipment and Supplies: Cans, glass containers, closures for glass containers, seals and sealing machines, screw caps, frozen food containers, paper boxes, crowns, metal caps, wrapping machines, labelling and case packing machines, fibre containers, Cellophane containers, etc.

Chicory Shortage

Owing to the severe drought which has prevailed in the chicory-growing areas in South Africa it is anticipated that there will be a shortage towards the end of this year and it will be necessary to import supplies.

In recent years production of chicory in the Union has increased considerably and its importation had been reduced to negligible proportions.

Israeli Citrus Industry

A comprehensive plan for the rehabilitation of the Israeli citrus-growing industry is to be devised jointly by the Israel Government and the country's Farmers' Association. The Government has decided to make loans to farmers to help them cultivate their groves this season, and is advancing approximately £(Israeli) 1,600,000, of which half is re-payable in twelve years at 2 per cent.

Fish Oil Research in Norway

Norway's fish oil industry has been carrying out considerable extensions and together with some of the fishermen's organisations it is intended to establish a research institute at Bergen. Its task will be to find the best methods for the most efficient utilisation of the raw material, and for this purpose it is proposed to run an experimental mill at the institute.

News from the Ministries

Prices of Oils and Fats

No change will be made in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period ending July 16, 1949.

Imports of Sperm Oil

From May 22 the import of sperm oil, from certain sources, will be allowed under specific licence. Applications for import licences should be made on Board of Trade form ILD/K to the Import Licensing Department, Board of Trade, 189, Regent Street, London, S.W. 1.

Resignation

Major-General Desmond Harrison, C.B., D.S.O., M.I.C.E., has resigned from the Board of the Overseas Food Corporation and the post of General Manager in Africa.

Bacon from Holland

A contract has been agreed with the Netherlands Government under which the Netherlands will supply bacon to the United Kingdom during the four years 1949-1952. The quantities to be delivered will be not less than 10,000 tons for 1949, for 1950 not less than 25,000 tons, and for 1951 not less than 35,000 tons. The actual quantities are likely to be substantially larger, target figures of 40,000 tons for 1950 and 60,000 tons for 1951 having been agreed. The Ministry of Food has undertaken to accept these quantities if they are offered.

The two Governments will discuss in 1950 the quantities to be fixed for 1952, and it has been agreed that the Ministry of Food will take not less than 45,000 tons in that year.

Industrial Alcohol Decontrolled

Industrial (ethyl) alcohol, butyl alcohol, acetic acid, and acetic anhydride have been freed from control from June 1, 1949.

Saccharin Freed from Control

As supplies of saccharin and similar artificial sweeteners are now sufficient to satisfy the demand, these products have been freed from price and permit control. The Saccharin (Control and Maximum Prices) Order, 1944, was accordingly revoked on May 21, and on the same date a new Order, the Saccharin Order, 1949, came into force for the purpose of retaining the quality standards and labelling provisions of the old Order. Under the new Order sales of saccharin and sweetening tablets by retail will no longer be confined to 100-size packets, but it will still be necessary to state the number of tablets contained in the packet.

Food manufacturers are reminded, nevertheless, that they will still have to obtain licences under the Manufactured and Prepacked Foods Order for the manufacture of any product containing saccharin or other artificial sweeteners.

Oils and Fats Order Amended

The Oils and Fats Order, 1949, consolidates and re-enacts with amendments the following five Orders:

1. The Animal Fats (Control and Prices) Order, 1946.
2. The Edible Oils and Fats (Control of Sale) Order, 1944.
3. The Oils and Oilseeds (Control) Order, 1946.
4. The Lard (Control and Maximum Prices) Order, 1943.
5. The Margarine and Cooking Fats (Requisition) Order, 1940.

The new Order, which came into force on May 22, 1949, also revokes the Margarine (Pre-packing) Order, 1940.

The principal amendments are as follows:

1. All restrictions have been removed from the sale of olive oil and sperm oil.
2. Sunflower seed and sunflower seed oil have been added to the list of oilseeds and oils which are subject to control.
3. A new definition of "technical tallow" has been included and the old definitions of "cooking fats" and "lard" have been made more precise.
4. A definition of the term "edible oil" has been replaced by a list of oils, fats, and mixtures which may be obtained only against a permit.

Ministry of Food Move

The headquarters of the Ministry of Food has moved from Montagu House, Whitehall, to Dean Bradley House, Horseferry Road, London, S.W.1. Telephone: Abbey 9030.

Sweetened Dessert Powder

A limited quantity of prepacked sweetened dessert powder may be imported from Norway during 1949 under specific licence.

Importers will be nominated by the Norwegian manufacturers, and each nominated firm will be advised by the Ministry as soon as the nomination list is received from the Norwegian authorities.

Closer Watch on Food Poisoning

As part of the close watch kept by the Ministry of Health and local authorities on food poisoning outbreaks, further guidance has been sent by the Ministry to local Medical Officers of Health in England and Wales in the form of a memorandum on steps to be taken in investigating illness believed to have been caused by food.

Under the Food and Drugs Act, 1938, cases of food poisoning have to be notified by doctors to the local Medical Officer of Health. He is able to call on the Public Health Laboratory Service—a war-time organisation which now has a permanent peace-time role—to help him in detecting the source and type of any particular food infection.

It is of great importance to the Ministry to have systematic information on a national basis for the study of all the factors concerned in food poisoning. Since the beginning of the year, Medical Officers of Health have, at the request of the Registrar-General, included notified cases of food poisoning in their weekly returns and are making a quarterly return of figures when notifications have, where necessary, been corrected as the result of further investigation. Medical Officers of Health are also being asked to send the Ministry a summary of any small or large groups of cases recognised as a new outbreak as soon as possible after occurrence, and to let the Ministry have an annual analysis of the total of notified cases.

Bread Subsidy for Scotland

The negotiations concerning the rate of bread subsidy payable to bakers in Scotland, which were suspended while the Wages Council and the Ministry of Labour considered a wage increase, have now been concluded. The rate of subsidy will continue to be 8s. 4½d. per sack. Bakers will receive compensation for the deduction of 6d. per sack which was provisionally made from December 5.

Condensed Milk Price Increases

The Condensed Milk (Control and Maximum Prices) Order, 1948, has been further amended to prescribe increased maximum selling prices of the sweetened varieties of condensed milk. These increases are being made to bring prices into conformity with costs. No changes are being made in the prices of full cream unsweetened condensed milk.

Fifty Bacon Factories to Re-open

The steady increase which has taken place in the pig population under the agricultural expansion programme has resulted in the number of pigs available each week for bacon curing again reaching the level at which it stood in July, 1942, when about fifty factories were closed under the bacon curing industry concentration scheme. It has therefore been decided that these closed factories may re-open on October 2 next, by which time the necessary overhaul and re-instatement work will have been completed at most of them.

Canadian Canned Salmon

Arrangements were made during the recent visit of the Canadian Minister of Trade and Commerce to the United Kingdom for a representative of the British Ministry of Food to visit Canada to negotiate for the purchase of canned salmon from the 1949 pack. These negotiations have ended in agreement by the Ministry of Food to buy in the aggregate 410,000 cases at a cost of about 7 million dollars. The salmon will be shipped during the second half of this year.

Information and Advice

Cake Decorations

B.3459. *Please supply us with a formula for the manufacture of cake decorations used for garnishing pastries.* (Sweden.)

The following formula was submitted as a basis for trial :

	lb.
Finely ground sugar	140
Gelatine	2
Farina	28
Gum tragacanth	4

A firm dough is made from the above formula and passed through an extruding machine. The broken threads when dry are placed in a dragee pan, warmed up to about 85° F., and treated with successive charges of sugar syrup at 30° Beaumé rising to 35° Beaumé, and dusted with warm corn starch until the desired thickness of coating has been attained.

Chocolate Vermicelli

B.3465. *We are anxious to obtain details of the manufacture of chocolate vermicelli.* (Notts.)

A firm dough is made from plain chocolate mass and sufficient soya flour to attain this. The mass is refined once and passed through an extruding machine. (Name of suppliers was given.)

When the pieces have dried, they are placed in a dragee pan, warmed to about 85° F., and either polished with beeswax or treated with 30° Beaumé to 35° Beaumé sugar syrup and corn starch dustings. The last charges of syrup are chocolate-brown coloured.

When the threads of mass pass out of the extruding machine, it is advisable to carry them away from the machine by means of a synchronised conveyor belt to facilitate handling. The threads will dry fairly quickly, and may be broken up by hand.

Information Supplied

B.3407. *Manufacturers of coffee mills.* (London.)

B.3410. *Manufacturer of antiseptic coating for metals.* (Norfolk.)

B.3411. *Suppliers of teaseed oil.* (Lancs.)

B.3412. *Manufacturers of vitamin oil concentrates.* (Jamaica.)

B.3415. *Manufacturers of automatic machinery for packing twists of salt in potato crisp packets.* (Devon.)

B.3418. *Manufacturer of bottle caps.* (Ireland.)

B.3420. *Manufacturers of margarine packing machinery.* (Palestine.)

B.3421. *Suppliers of biscuit wrapping machines.* (London.)

B.3422. *Suppliers of monosodium glutamate.* (Lanark.)

B.3424. *Suppliers of air and CO_2 volume tester.* (Belgium.)

B.3427. *Manufacturers of bottle seals.* (New Zealand.)

B.3434. *Suppliers of monosodium glutamate.* (London.)

B.3438. *Manufacturers or importers of edible rice paper.* (Northumberland.)

B.3446. *Supplier of machinery suitable for producing potato straws.* (Lancs.)

B.3447. *Manufacturer of a small hand machine for sealing foil capsules.* (London.)

B.3460. *Suppliers of salami and boiling chickens.* (Yorks.)

B.3463. *Importers of quick-frozen cod and plaice fillets.* (Denmark.)

B.3464. *Suppliers of all-electric bakeries.* (South Africa.)

B.3466. *Makers of fish meal processing plant.* (Berks.)

B.3470. *Makers of an automatic fruit juice extractor.* (Lancs.)

B.3471. *Manufacturers of biscuit machinery.* (Republica Dominicana.)

B.3473. *Suppliers of a small hand vacuum gauge and manufacturers of a resistant flooring.* (Ross.)

B.3475. *Suppliers of metal drums of approximately 15 gallons capacity.* (Leics.)

B.3477. *Manufacturers of lemon curd.* (London.)

B.3479. *Suppliers of machinery for making ice cream cups.* (Ceylon.)

B.3483. *Suppliers of small grinders for laboratory use.* (Staffs.)

B.3484. *Suppliers of icemaking plant.* (Sudan.)

B.3488. *Manufacturers of automatic bread plant.* (Uganda.)

B.3494. *Suppliers of plant necessary for popcorn manufacture.* (Stirling.)

B.3497. *Suppliers of methyl cellulose and polygalactose cylose.* (London.)

B.3500. *Suppliers of cheese flavouring.* (Hants.)

B.3501. *Suppliers of sifters, mixers, powder filling machines, sieving and grading machines.* (Middx.)

B.3503. *Suppliers of peanut butter machinery.* (New Zealand.)

B.3506. *Manufacturers of milk processing and canning machinery.* (Trinidad.)

B.3507. *Suppliers of defoaming and emulsifying agents.* (Worcs.)

B.3511. *Manufacturers of packing machinery.* (Derby.)

B.3514. *Suppliers of packing machinery.* (Yorks.)

B.3515. *Suppliers of natural grape sugar.* (Lancs.)

B.3522. *Suppliers of lecithin.* (London.)

Information Required

B.3505. *Manufacturers of cereal puffing guns, either English or American.* (South Africa.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. 6d. weekly (annual subscription £3 15s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 2s. each.

617,639. DOWTY EQUIPMENT, LTD., and CAREY, F. H.: Liquid pumps and liquid supply systems.

617,750. MEGATOR PUMPS AND COMPRESSORS, LTD., and MCCOMBIE, F. W.: Rotary pumps for delivering liquids.

617,836. JOB, E.: Dough-moulding apparatus.

617,843. STEVENS, A. H. (Murdock, I. M.): Bottle stopper.

617,857. NOYES, H. A.: Method of preserving fruit products.

617,858. NOYES, H. A.: Method of concentrating substances in solution.

617,860. NOYES, H. A.: Method of filtering by the use of ice particles.

617,881. BURNHAM SOLUBLE IODINE CO.: Water-disinfecting compound and method of treating water.

617,910. VERHEIJ, H.: Machines for making rolls of dough in loaf form.

Abstract of a Recent Specification

Feeding Batter to Moulds for making Ice Cream Cones or Biscuits

The invention relates to means for feeding batter to moulds in machines for making cones or biscuits for containing ice cream, and more particularly to means for regulating the feed of the batter by means of a barrel, which is provided with pockets for measuring the batter and is rotated intermittently, so that each row of pockets successively receives batter and discharges it to the moulds.

A displacer or plummet is provided to enter each pocket of a feeding barrel as it is brought into position to receive batter, and to recede from the pocket as the barrel rotates to remove the charged pockets to the discharge position, the displacer being pivotally mounted and so shaped as to move under gravity into each corresponding pocket when brought into feeding position and to be forced out of the pocket by engagement with the barrel on the next rotational movement of the barrel.

Means are provided for either individual or collective adjustment of the plummets, to regulate the depth of penetration in the pockets.

616,732. *Ernest Leopold Marshall.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

LAUREL-WHIP.—659,423. Filling or decorative preparations for use in the bakery and confectionery trades. **Lawrence and Hilton, Limited,** 481, Waterloo Road, Blackpool, Lancashire; Manufacturers.

DRESDEN CHINA.—664,179. Non-medicated confectionery. **Lloyd Owen (Overseas), Limited,** 2, Broad Street Place, London, E.C.2; Manufacturers.

ORCHARD VALLEY.—665,134. Canned fruits and canned vegetables. **A. J. Mills and Company, Limited,** Colonial House, Tooley Street, London, S.E.1; Manufacturers.

CORONA.—665,610. Vinegar and sauces. **Thomas and Evans, Limited,** 24, Hannah Street, Porth, Glamorgan; Manufacturers and Merchants.

WIZMIX.—666,928. Mixing machines. **Thomas Auton Race,** 169, Westbury Avenue, Southall, Middlesex; Manufacturer and Merchant.

PUNCH.—669,299. Pickles. **Holbrooks, Limited,** 203, Ashted Row, Birmingham; Cheapside, Stourport, Worcestershire; and 68, Fenchurch Street, London, E.C.2; Sauce and Pickle Manufacturers.

TEMPTUR.—669,786. Air cooling and air conditioning apparatus. **Temperature, Limited,** 27, Old Church Street, Chelsea, S.W.3; Manufacturers.

DICKY DATES.—670,354. Dates. **P.E.P. (Traders), Limited,** 39 King Street, London, W.C.2; Merchants.

TRUSIL.—671,200. Flavourings (other than essential oils) for food. **W. J. Bush and Company, Limited,** 28, Ash Grove, Hackney, London, E.8; Chemical Manufacturers.

STORM QUEEN.—671,272. Canned fish. **Norrig Hermetikk-Fabrikker Aktieselkabet** (a Joint Stock Company incorporated under the laws of Norway), Lervig 33, Stavanger, Norway; Manufacturers.

NATMILCO.—676,437. Preparations in powdered form consisting of milk and cocoa, the milk predominating. **The Minister of Food,** Ministry of Food, Welfare Foods Division, Mount Royal, Colwyn Bay, Denbighshire.

New Companies

Jacobs Potato Crisps, Limited. (463702.) 230, Martins Bank Building, Water Street, Liverpool. Nom. cap.: £5,000 in £1 shares. Permt. dirs.: A. Dickinson, 111, Queens Drive, Liverpool, 15; B. N. Jacobs, The Adelphi Hotel, Liverpool; H. Butt, Rossmore, 276, Chester Road, Whitby, Ellesmere Port.

Arthur Whittaker and Company, Limited. (463771.) 30, Church Street, Newton Heath, Manchester, 10. To carry on business of manufacturers of and dealers in essences and flavourings and colouring matters for use in ice creams, foodstuffs, etc. Nom. cap.: £3,000 in £1 shares. Dirs.: A. Whittaker and Mrs. E. Whittaker, 22, Delamere Road, Ainsdale, Southport.

Elamen, Limited. (465032.) 167, Hammersmith Road, W.6. To carry on business of distillers, refiners, and blenders of essences, oils, and flavouring materials, etc. Nom. cap.: £100 in £1 shares. Dirs.: not named. Subs.: C. F. Miller (law clk.) and W. J. Lovell (clk.), 199, Piccadilly, W.1.

Glosana, Limited. (465034.) To carry on business of manufacturers of and dealers in health, vegetarian, and dietetic foods, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: R. L. Matchett, 67, Mill Road, Burgess Hill; Irene E. A. Barratt, 90, Gladstone Park Gardens, Cricklewood, N.W.

S. Murphy, Limited. (465058.) 23, Welby Street, Grantham, Lincs. To carry on business of manufacturers of and dealers in foods, drinks, sweets, confectionery, grains, cereals, etc. Nom. cap.: £4,000 in £1 shares. Dirs.: J. M. Doyle, 15, Devon Street, Nottingham; C. H. Grundy, Stone House, Signal Road, Grantham; N. H. Harcourt and A. Roberts.

Popular Food Products, Limited. (465147.) 2/5, Old Bond Street, W.1. To carry on business of manufacturers of and dealers in food, provisions, groceries, meat extracts, sandwich fillings, etc. Nom. cap.: £1,000 in £1 shares. Dir.: J. Baldock, Primrose Cottage, Amberley, Arundel.

A. H. Hanning and Company, Limited. (465158.) 2, Endsleigh Street, W.C.1. To carry on business of manufacturers and dealers in potato crisps and all kinds of food and food products, etc. Nom. cap.: £100 in £1 shares. Dirs.: A. H. Hanning, 4, Parklands Court, Heston; J. P. M. van Dietz, Hambledon Rectory, Henley-on-Thames.

Davies (The Baking Specialist), Limited. (466575.) 10A, Woodthorpe Road, Ashford, Middlesex. Nom. cap.: £7,500 in £1 shares. Permt. dirs.: A. Davies and Mrs. L. R. Davies, 12, Fordbridge Road, Ashford, Middlesex.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.